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Love, Sex & Science



LOVE, SEX AND SCIENCE

From the Editors of Scientific American

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Letters to the Editor

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LOVE, SEX AND SCIENCE

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Introduction: As Many Kinds of Hearts

It is virtually impossible to talk about love without being cliché or repeating what thousands, probably millions, of writers, artists, and musicians have expressed before. Love has always been endlessly fascinating. Opinions of it vary, from Tennyson's belief that "tis better to have loved and lost/than never to have loved at all" to Neil Gaiman's rhetorical question, "have you ever been in love? Horrible, isn't it?" Whether a joy or a burden, love is ubiquitous

And, as this eBook will attest, scientists are just as interested as poets in the affairs of the heart. It might be more romantic to attribute one's feelings to Cupid's unpredictable arrow, but it is more useful to understand how our brains and bodies are biologically involved in choosing the target. In an age when a marriage's chances of ending in divorce seem as likely as a coin flip landing on tails, an assessment of our motivations could help us to choose more suitable partners and strengthen healthy relationships. Conversely, a better understanding of our partner could help us to communicate when someone of the opposite sex seems to be speaking Klingon.

Section 1 takes a look at perceived sex differences between men and women – are we really as different as Mars and Venus? As our opening story shows, few other questions can get at the heart of this debate like "Can heterosexual men and women ever be 'just friends'?" In fact, new research suggests that the answer is no. Subsequent articles question the accuracy of the Mars-Venus comparison, including "The Truth About Boys and Girls," which reviews research on brain structure and behavioral differences, and "He Said, She Said," which focuses on linguistics and differences in conversational style.

The control that this kind of knowledge offers us has already been exerted in the way we carefully tailor our online image, and Section 2

discusses the brave, not-so-new world of online dating. The increased digitization of our social interactions has changed the way men and women meet and get to know each other. The first story, “Dating in a Digital World,” analyzes the pros and cons of online romance. On one hand, dating websites have millions of users (with more joining everyday), and may be responsible for as much as a fifth of new relationships. On the other, they also change the way dating decisions are made, not always for the better. Section 3 continues this train of thought, assessing how and why we select the partners we do.

While science and technology offer an enormous amount of say in our own romantic destinies, there is also a good deal that is out of our sweaty-palmed hands. Section 4 looks at what happens to the brain when we’re in love. Several stories review fMRI studies; in particular “All You Need Is Love” finds that romantic love stimulates the same pathways as an addictive drug – results that probably don’t come as a complete surprise.

Section 5 focuses on questions of gender and sexuality. “Do Gays Have a Choice?” analyzes a wealth of scientific evidence and shows that sexual orientation is determined more by both genes and environment, rather than being a choice we make. Because discussions of gender and sexual orientation are often so politically contentious, it is important to understand the science behind subjects such as transsexuality and the sexual continuum in order to advance a more unbiased perspective.

But the science behind love and sex isn’t all roses, and Section 6 looks at the darker side. Questions such as why people are drawn to narcissistic personalities or why some men buy sex are just as important as understanding why falling in love increases our creativity. To ignore the darker aspects of love is to trivialize it.

We’re aware of the contradictions presented in this book. Love’s paradoxes are one of the reasons why it is The Topic for cultural discourse. As Leo Tolstoy pointed out, “there are as many kinds of love as there are hearts.” This eBook cannot discuss all the kinds of love or all the kinds of hearts, but we hope it will be helpful in understanding your own.

-Hannah Schmidt
Book Editor

SECTION 1

**Men Are from Mars, Women Are
from Venus**

Men and Women Can't be "Just Friends"

by Adrian F. Ward

Can heterosexual men and women ever be "just friends"? Few other questions have provoked debates as intense, family dinners as awkward, literature as lurid, or movies as memorable. Still, the question remains unanswered. Daily experience suggests that non-romantic friendships between males and females are not only possible, but common—men and women live, work, and play side-by-side, and generally seem to be able to avoid spontaneously sleeping together. However, the possibility remains that this apparently platonic coexistence is merely a façade, an elaborate dance covering up countless sexual impulses bubbling just beneath the surface.

New research suggests that there may be some truth to this possibility—that we may think we're capable of being "just friends" with members of the opposite sex, but the opportunity (or perceived opportunity) for "romance" is often lurking just around the corner, waiting to pounce at the most inopportune moment.

In order to investigate the viability of truly platonic opposite-sex friendships—a topic that has been explored more on the silver screen than in the science lab—researchers brought 88 pairs of undergraduate opposite-sex friends into...a science lab. Privacy was paramount—for example, imagine the fallout if two friends learned that one—and only one—had unspoken romantic feelings for the other throughout their relationship. In order to ensure honest responses, the researchers not only followed standard protocols regarding anonymity and confidentiality, but also required both friends to agree—verbally, and in front of each other—to refrain from discussing the study, even after they had left the testing facility. These friendship pairs were then separated, and each member of each pair was asked a series of questions related to his or her romantic

feelings (or lack thereof) toward the friend with whom they were taking the study.

The results suggest large gender differences in how men and women experience opposite-sex friendships. Men were much more attracted to their female friends than vice versa. Men were also more likely than women to think that their opposite-sex friends were attracted to them—a clearly misguided belief. In fact, men's estimates of how attractive they were to their female friends had virtually nothing to do with how these women actually felt, and almost everything to do with how the men themselves felt—basically, males assumed that any romantic attraction they experienced was mutual, and were blind to the actual level of romantic interest felt by their female friends. Women, too, were blind to the mindset of their opposite-sex friends; because females generally were not attracted to their male friends, they assumed that this lack of attraction was mutual. As a result, men consistently overestimated the level of attraction felt by their female friends and women consistently underestimated the level of attraction felt by their male friends.

Men were also more willing to act on this mistakenly perceived mutual attraction. Both men and women were equally attracted to romantically involved opposite-sex friends and those who were single; “hot” friends were hot and “not” friends were not, regardless of their relationship status. However, men and women differed in the extent to which they saw attached friends as potential romantic partners. Although men were equally as likely to desire “romantic dates” with “taken” friends as with single ones, women were sensitive to their male friends’ relationship status and uninterested in pursuing those who were already involved with someone else.

These results suggest that men, relative to women, have a particularly hard time being “just friends.” What makes these results particularly interesting is that they were found within particular friendships (remember, each participant was only asked about the specific, platonic, friend with whom they entered the lab). This is not just a bit of confirmation for stereotypes about sex-hungry males and naïve females; it is direct proof that two people can experience the exact same relationship in radically different ways. Men seem to see myriad opportunities for

romance in their supposedly platonic opposite-sex friendships. The women in these friendships, however, seem to have a completely different orientation—one that is actually platonic.

To the outside observer, it seems clear that these vastly different views about the potential for romance in opposite-sex friendships could cause serious complications—and people within opposite-sex relationships agree. In a follow-up study, 249 adults (many of whom were married) were asked to list the positive and negative aspects of being friends with a specific member of the opposite sex. Variables related to romantic attraction (e.g., “our relationship could lead to romantic feelings”) were five times more likely to be listed as negative aspects of the friendship than as positive ones. However, the differences between men and women appeared here as well. Males were significantly more likely than females to list romantic attraction as a benefit of opposite-sex friendships, and this discrepancy increased as men aged—males on the younger end of the spectrum were four times more likely than females to report romantic attraction as a benefit of opposite-sex friendships, whereas those on the older end of the spectrum were ten times more likely to do the same.

Taken together, these studies suggest that men and women have vastly different views of what it means to be “just friends”—and that these differing views have the potential to lead to trouble. Although women seem to be genuine in their belief that opposite-sex friendships are platonic, men seem unable to turn off their desire for something more. And even though both genders agree overall that attraction between platonic friends is more negative than positive, males are less likely than females to hold this view.

So, can men and women be “just friends?” If we all thought like women, almost certainly. But if we all thought like men, we’d probably be facing a serious overpopulation crisis.

--Originally published: Scientific American online, October 23, 2012.

The Truth about Boys and Girls

by Lise Eliot

Parents anticipate sex differences from the first prenatal ultrasound but then seem amazed when their son goes gaga over trucks or their daughter will wear nothing but pink. Boys and girls are obviously different, and in many cases the gaps between them seem stark. But stereotypes do not always hold up to scientific scrutiny. Are boys really more aggressive and girls really more empathetic—or do we just see what we expect in them? Where true sex differences exist, are those gaps inborn, as our current Mars-Venus obsession implies, or shaped by environment—that is, by us?

A natural place to look for answers is in the brain. If there is a neurological disparity between the genders, it could explain important behavioral differences. But surprisingly, researchers have found very few large-scale differences between boys and girls in brain structure or function. Yes, boys have larger brains (and heads) than girls—from birth through old age. And girls’ brains finish growing earlier than boys’. But neither of these findings explains why boys are more active and girls more verbal or reveals a plausible basis for the consistent gaps in their reading, writing and science test scores that have parents and teachers up in arms.

Brain differences are indisputably biological, but they are not necessarily hardwired. The crucial, often overlooked fact is that experience itself changes brain structure and function. Neuroscientists call this shaping plasticity, and it is the basis of all learning and much of children’s mental development. Even something as simple as the act of seeing depends on normal visual experience in early life, without which a baby’s visual brain fails to wire up properly and his or her vision is permanently impaired.

Does growing up as a boy or as a girl also wire the brain in a particular way? Obviously, girls and boys are not identical at birth: genetic and hormonal differences must launch the male and female brain down somewhat different developmental pathways. But early experience, we now know, permanently alters the chemistry and function of the genes inside cells, leading to significant effects on behavior. Neuroscientist Michael J. Meaney and his colleagues at McGill University, among others, have found that the quality of maternal care is associated with a host of neural and psychological consequences—from the production of new brain cells to altered stress responses and memory function. The different ways parents raise boys and girls may similarly leave its stamp on their developing brains.

Most sex differences start out small—as mere biases in temperament and play style—but are amplified as children’s pink- or blue-tinted brains meet our gender-infused culture, including all the tea parties, wrestling matches, playground capers and cafeteria dramas that dominate boys’ or girls’ existence. Through better understanding of these environmental influences, we can break down some of the gaps between boys and girls—in school achievement, risk taking, competitiveness, empathy and conscientiousness.

The Kickoff

Boys are more physically active than girls, in infancy and throughout childhood. They kick, swing their arms and race around the house noticeably more than girls do, as many exhausted parents can testify. The difference may emerge before birth, although not every ultrasound study finds a sex difference in fetal movement. Nevertheless, the disparity is clear during the first year and expands through childhood, according to a 1986 analysis of more than 100 studies by psychologist Warren Eaton and his colleagues at the University of Manitoba in Canada, which reveals that the average boy is more active than about 69 percent of girls.

That gap is statistically moderate, larger than differences in verbal and math skills but small enough to permit many exceptions to the rule, notably the 31 percent of girls who are *more* active than the average boy. Sex hormones—in particular, a relative abundance of testosterone in the womb—appear to trigger boys’ fidgetiness. And yet the sex difference in

physical activity continues to widen during childhood, despite the fact that sex hormone levels do *not* differ between boys and girls from six months of age to puberty. Parenting is likely one factor amplifying the disparity. Mothers discourage physical risk taking more in daughters than in sons, suggest studies in the laboratory and on playgrounds. (Fathers encourage more risk taking in children than mothers do but no one has studied whether dads pressure sons more than daughters in this respect.) Peers also push conformity: in their preferred all-boy groups, energetic boys feed off one another, whereas energetic girls tend to settle down in clusters of more docile friends. In organized sports, girls start playing at a later age, quit earlier and join fewer teams overall than boys—differences that are influenced by parents and peers.

As many schools eliminate recess or cut back on physical education, both genders are paying the price with higher rates of obesity and attention-deficit hyperactivity diagnoses. Boys especially need more frequent physical breaks to satisfy their higher activity levels, and both sexes need the mental recharging that exercise confers during a long school day. Exercise is also important for maintaining a positive body image, which turns out to be the biggest risk factor for depression in adolescent girls.

Boy Meet Barbie

Yes, boys like trucks and girls like dolls. Given a choice of Power Rangers, Tonka, Bratz and a Barbie beauty set, preschool-age boys and girls strongly prefer the gender-obvious picks. In fact, children's gendered toy choice is one of the largest sex differences in behavior, second only to sexual preference itself! But this preference is not nearly so clear in infancy, when boys, in many studies, have been found to like dolls as much as girls do. (All babies are strongly attracted to faces, for obvious survival reasons.) Rather, toy preference emerges toward the end of infancy, grows stronger through the preschool years and then declines somewhat because of a complex interaction of nature and nurture.

Toddlers' toy preference is shaped, in part, by prenatal testosterone: girls with a genetic disorder that exposes them to high levels of testosterone and other androgens before birth are much more interested in toy trucks and cars than typical girls are. Even male and female monkeys prefer

gender-stereotyped toys, telling us there is something about vehicles, balls and moving parts that resonates with boys' hormonal priming, drawing them away from their initial face preference and toward toys they can interact with more physically.

Starting from this innate bias, children's toy preferences grow more extreme through social shaping. Parents reinforce play that is considered gender-appropriate, especially in boys, and beginning at age three, peers perpetuate gender norms even more than adults do. In one example of peer influence, psychologists Karin Frey of the University of Washington and Diane Ruble of New York University reported in 1992 that elementary school-age boys and girls both opted for a less desirable toy (a kaleidoscope) over a slick Fisher-Price movie viewer after watching a commercial of a same-sex child choosing the kaleidoscope and an oppositesex child choosing the movie viewer. And yet around age five, girls begin choosing "boy" toys and "girl" toys equally. Boys, however, rarely do this crossover—a divergence that reflects different societal norms. Girls today are allowed—and even encouraged—to play sports, wear pants and build with Legos much more than boys are pushed to don dresses and play house.

The different play preferences of boys and girls are important in shaping many mental circuits and later abilities. Sporting gear, vehicles and building toys tend to exercise physical and spatial skills, whereas dolls, coloring books and dress-up clothes tend to stimulate verbal, social and fine-motor circuits. Parents and preschool teachers can expand both sets of skills by encouraging girls to play with puzzles, building blocks, throwing games and even video games, while enticing boys to sew, paint, and play as caregivers using props for doctor, Daddy, zookeeper, EMT, and the like.

Sticks and Stones

Boys are more physically aggressive than girls, according to many studies, including a 2004 analysis by psychologist John Archer of the University of Central Lancashire in England. That difference is linked to prenatal testosterone but not, surprisingly, to the resurgence in boys' testosterone level in adolescence, because boys do not suddenly become more aggressive when they go through puberty, as Archer's work also indicates. Nor is this sex difference absolute. Two- and three-year-old

girls, for instance, frequently kick, bite and hit other people—not quite as much as toddler boys but about three times more than either sex does later in childhood. In addition, girls fight with indirect, or relational, aggression. Through gossip, ostracism, whispers and, most recently, harassing text messages, girls leave more scars on competitors' psyches than on their bodies.

Thus, both sexes compete and both sexes fight; what differs is the degree to which such behavior is overt or hidden. Because physical aggression is a much greater taboo for girls than boys, they learn, even early in elementary school, to keep it below the surface, in the eye rolling and best-friend wars that teachers rarely notice and are harder to police.

But by admitting that competitive feelings are natural for all children, we can find ways to channel them into healthier pursuits. In recent years educators have tended to take competition out of the classroom, reasoning that the opposite style of interaction—cooperation—is more important in a civil society. But competition can be highly motivating, especially for boys, and girls need to develop greater comfort with open competition, which remains an inescapable reality of our free-market culture. One solution is team competitions, where groups of students work together to try to beat others at solving math, vocabulary, history and science problems.

I Know How You Feel

Aggression and empathy are inversely related. It is hard to attack someone if you are acutely aware of what he or she is feeling. So whereas men and boys score higher on measures of physical and verbal aggression, girls and women score higher on most measures of empathy, or the awareness and sharing of other people's emotions, conclude psychologist Nancy Eisenberg of Arizona State University and her colleagues in studies dating back to the 1980s.

And yet the sex difference in empathy is smaller than most people realize and also strongly dependent on how it is measured. When men and women are asked to self-report their empathetic tendencies, women are much likelier than men to endorse statements such as "I am good at knowing how others will feel" or "I enjoy caring for other people." When

tested using more objective measures, however, such as recognizing the emotions in a series of photographed faces, the difference between men and women is much smaller, about four tenths of a standard deviation, meaning the average woman is more accurate than just 66 percent of men.

In children, the difference is tinier still, less than half that found in adults, reported psychologist Erin McClure of Emory University in 2000 after analyzing more than 100 studies of sex differences in facial emotion processing in infants, children and adolescents. So although girls do start out a bit more sensitive to other people's faces and emotions, their advantage grows larger with age, no doubt because of their stronger communication skills, more practice at role playing with dolls and more intimate friendships as compared with boys.

Little is known about the neural basis for the sex difference in empathy, although a grape-size region on each side of the brain called the amygdala is likely to be involved. The amygdala is highly activated by faces. According to a 2002 analysis of several studies, the amygdala is larger in men than in women, a fact that seemingly belies men's lesser ability to recognize facial emotions. Other studies reveal an imbalance in the activation of the right and left amygdala in men and women, however. When they are recalling highly charged emotional scenes—the kind that trigger empathetic responses—women's left amygdala is more strongly activated than their right amygdala, whereas the right amygdala is more strongly activated than the left in men, as indicated by both a study in 2004 led by neurobiologist Larry Cahill of the University of California, Irvine, and a report in 2002 by psychologist Turhan Canli, then at Stanford University, and his colleagues.

It is not yet known if this left-right difference in amygdala activation is related to empathy per se or if the same neural sex difference is present in children. Indeed, when it comes to emotionality, boys and girls differ much less in early life; if anything, baby boys are known to cry and fuss more than baby girls. As boys grow, they—much more than girls—are taught to hide their expressions of fear, sadness and tenderness. Scientists agree that social learning largely shapes the male-female gap in emotional responding. Boys are toughened up in a way girls rarely are, making them less expressive but also less attuned to others' feelings. This training

almost certainly leaves its imprint on the amygdala, one of the more plastic structures in the brain. Teaching girls to be more resilient and boys to be more sensitive is possible and beneficial for both genders.

Girl Talk

Let us dispense with the urban legend that “women speak three times more words every day than men.” The real numbers: 16,215 for women and 15,669 for men, according to a 2007 study of nearly 400 college students fitted with digital recorders, led by psychologist Matthias Mehl of the University of Arizona. Females do outscore males on most measures of speaking, reading, writing and spelling from early childhood and throughout life, but the gaps are generally small and change with age.

Language differences emerge early in development. As infants, girls begin talking about one month earlier than boys and are some 12 percent ahead of boys in reading skills when kindergarten begins. Girls’ advantage in reading and writing continues to grow through school, until by 12th grade, an alarming 47 percent more girls than boys graduate as proficient readers, with an even larger gap for writing, a conclusion drawn from several decades of data collected by the U.S. Department of Education.

These gaps appear to shrink in adulthood, however. The average woman scores higher than just 54 percent of men on a combined measure of all verbal skills, indicates a 1988 analysis by psychologist Janet Hyde and her colleagues at the University of Wisconsin–Madison. That the difference is so tiny may explain why the neural bases for language or literacy differences have yet to be uncovered. In 2008 neuroscientist Iris Sommer and her colleagues at University Medical Center Utrecht in the Netherlands dispelled one popular theory—that women use both sides of the brain to process language, whereas men use mainly the left. In their analysis of 20 functional MRI studies, the researchers detected no difference in the degree of language lateralization between men and women.

Similarly, there is scant proof that girls and women are better neurologically wired for reading. If anything correlates with reading skill, it is quite simply the amount of reading children do for pleasure outside

school. Girls read more than boys, and this additional exposure makes a difference in their academic performance.

Beginning at birth, a child's language exposure is the single most important determinant of his or her later verbal abilities. Large studies in several different countries demonstrate that gender accounts for at most 3 percent of the variance in toddlers' verbal ability, compared with at least 50 percent determined by a child's environment and language exposure. Thus, the more parents can immerse their sons in conversation, books, songs and stories, the better are boys' chances of getting off to the right start in language and literacy skills. ABC and rhyming books are great for teaching phonemic awareness—the link between sounds and letters that is the first hurdle in learning to read. As compared with girls, boys often select different genres—especially nonfiction, comedy and action stories—so getting boys to read may be largely a matter of finding books and magazines that appeal to them. Schools with strong reading programs have managed to eliminate the difference between boys' and girls' scores, proving that this worrisome gap is more a matter of education and practice than inborn literacy potential.

Thinking in 3-D

If girls have the advantage in verbal skills, boys have it in the spatial domain—the ability to visualize and manipulate objects and trajectories in time and three-dimensional space. Sex differences in spatial skills are among the largest of the cognitive gaps. The average man can perform mental rotation—that is, he can imagine how a complex object would look when turned around—better than up to 80 percent of women.

In 2008 two research groups reported a sex difference in mental rotation in babies as young as three months of age, and other evidence suggests that this skill is influenced by prenatal testosterone. Yet the actual size of the skill gap is much smaller in children than in adults: among four-year-olds, the average boy outperforms just 60 percent of girls. So it seems likely that the skill improves in boys thanks to the wide range of visuospatial interests—targeting, building, throwing and navigating through innumerable driving and shooting games—that they pursue far more than girls. In support of this idea, neurobiologist Karin Kucian and her colleagues at University Children's Hospital in Zurich reported in a

2007 study that boys' and girls' brains display similar MRI patterns of neural activity while performing a mental rotation task that, as a 2005 study by the same researchers revealed, evokes different responses in the brains of adult men and women. So it appears that boys' and girls' brains diverge in spatial processing as they grow and practice different skills.

Spatial skills are important for success in several areas of science and higher math, including calculus, trigonometry, physics and engineering. Research by educational psychologist Beth Casey of Boston College shows that the spatial skill gap between boys and girls largely accounts for the consistent male advantage on the math SAT exam, an obvious hurdle for admission to engineering and other technical degree programs.

As important as they are, spatial skills are not something we deliberately teach in school. But many studies have shown they can improve with training, including playing video games! If boys naturally get more such practice in their extracurricular pursuits, girls may benefit from greater exposure to three-dimensional puzzles, fast-paced driving and targeting games, and sports such as baseball, softball and tennis.

Gender, Culture and the Brain

Boys and girls are different, but most psychological sex differences are not especially large. For example, gaps in verbal skills, math performance, empathy and even most types of aggression are generally much smaller than the disparity in adult height, in which the average five-foot, 10-inch man is taller than 99 percent of women. When it comes to mental abilities, males and females overlap much more than they stand apart.

Furthermore, few of these sex differences are as fixed, or hardwired, as popular accounts have lately portrayed. Genes and hormones light the spark for most boy-girl differences, but the flame is strongly fanned by the essentially separate cultures in which boys and girls grow up. Appreciating how sex differences emerge can reduce dangerous stereotyping and give parents and teachers ideas for crosstraining boys' and girls' minds, to minimize their more troubling discrepancies and enable all children to more fully develop their diverse talents.

--Originally published: Scientific American Mind 21(2), 22-29.
(May/June 2010).

He Said, She Said

by Deborah Tannen

Why don't men like to stop and ask directions? This question, which I first addressed in my 1990 book *You Just Don't Understand: Women and Men in Conversation*, garnered perhaps the most attention of any issue or insight in that book. It appeared on cocktail napkins ("Real men don't ask directions") and became a staple of stand-up comics as well as jokes that made the rounds: "Why did Moses wander in the desert for 40 years?" and "Why does it take so many sperm to find just one egg?"

The attention surprised me. I had not known how widespread this experience was, but I included the asking-directions scenario because it crystallized key aspects of a phenomenon that, I had discovered, accounts for many of the frustrations that women and men experience in conversation. I have spent more than three decades collecting and analyzing thousands of examples of how women and men interact and have found that men's talk tends to focus on hierarchy—competition for relative power—whereas women's tends to focus on connection—relative closeness or distance. In other words, a man and woman might walk away from the same conversation asking different questions: he might wonder, "Did that conversation put me in a one-up or one-down position?" whereas she might wonder, "Did it bring us closer or push us farther apart?"

But wait! All conversations, and all relationships, reflect a combination of hierarchy and connection—the two are not mutually exclusive but inextricably intertwined. All of us aspire to be powerful, and we all want to connect with others. Since the publication of *You Just Don't Understand*, I have continued to investigate the nuances of women's and men's ways of speaking to clarify how their conversational styles are different ways of reaching the same goals. My newest work explores the context in which women's focus on hierarchy and men's on connection is

most obvious and most intense: the family. In particular, sisters provide insight into relationships among women that are deeply influenced by competition as well as connection.

So what does any of this have to do with asking for directions? The route to the answer may not yet be obvious, but read on and I promise to get you there.

“Mine’s Higher” vs. “We’re the Same”

My interest in the linguistic differences between women and men grew from research I conducted early in my career on conversations between speakers of different ethnic and regional backgrounds. These interactions often led to misunderstandings because members of each group had contrasting assumptions about what should be said and the appropriate way to say it. I sensed, and later showed, a parallel pattern in conversations between women and men—a gender-based culture clash.

I often illustrate—and trace—this phenomenon using video clips of preschoolers at a day care center. In one scene, four little boys are sitting together, talking about how high they can hit a ball. “Mine’s up to there,” one small boy declares, raising his arm above his head. “Mine’s up to the sky,” a second responds, pointing higher. A third boy counters, “Mine’s up to heaven!” Then the fourth boy offers: “Mine’s all the way up to God.” These boys’ verbal exchange is obviously a game of hierarchy, as each one’s claim tops the preceding one.

I contrast this video clip with another from the same preschool: two little girls are sitting at a small table, drawing. One girl suddenly raises her head, looks at the other, and says (apparently referring to contact lenses), “Did you know that my babysitter, called Amber, has already contacts?” The second girl looks puzzled at first but quickly gathers herself together and announces, with apparent relish, “My mom has already contacts and my dad does, too!” The first girl laughs with glee at this echo response, which even matches the first girl’s odd syntax (“has already” rather than “already has”). After a pause, during which both girls return to drawing, the first one exclaims with delight, “The SAME?!” Being the same is as pleasing to her as topping one another is to the boys.

Although the specific conversational moves—topping versus matching—are different, what these contrasting conversations have in common is that they are rituals: self-evident assumptions about how the conversations should go and what a reasonable remark or response should look like. As with cross-cultural communication, we do not recognize them as rituals until we talk to others who do not share our assumptions.

Parents tell me that recognizing these as gender-related patterns in their children helps them deal with otherwise baffling behavior. For example, a woman recalled overhearing three little boys—her son and two of his friends—talking in the backseat as she was driving. One boy said, “When we went to Disneyland, we stayed three days.” The second boy said, “When we went to Disneyland, we stayed four days.” Then her son said, “We’re going to move to Disneyland!” She was troubled to hear him utter an obvious untruth. Should she instruct her son not to tell lies? I assured her that the boys knew that her family was not going to move to Disneyland. But her son won that round.

A father told me about a similar confusion upon overhearing a conversation between his little girl and her friend. The friend had said, “I have a brother named Benjamin and a brother named Jonathan.” His daughter responded, “I have a brother named Benjamin and a brother named Jonathan, too.” But she didn’t. Her father wondered why she would say such a thing. I explained that she was simply offering a matching experience as a sign of goodwill, to reinforce the friendship.

The contrasting focus on connection versus hierarchy also sheds light on innumerable adult conversations—and frustrations. Say a woman tells another about a personal problem and hears in response, “I know how you feel” or “the same thing happens to me.” The resulting “troubles talk” reinforces the connection between them. (Indeed, some women feel they have to dig up problems to tell friends to maintain intimacy.) Because this is not a conversational ritual he is used to, a man may well misread her conversational gambit as a request for help solving the problem. The result is mutual frustration: she blames him for telling her what to do and failing to provide the expected comfort, whereas he thinks he did exactly what she requested and cannot fathom why she would keep talking about a problem if she does not want to do anything about it.

Similar scenarios play out at work, where mutual misinterpretations may have career-altering consequences. For example, if a woman's boss overhears her telling a subordinate, "Could you do me a favor and get me a copy of that report?" he may think she lacks confidence. It appears to him as if she does not feel she has a right to ask her subordinate to do something. But the truth is probably the exact opposite. She knows the subordinate has to do what she asks. Her locution "do me a favor" is simply a way of not flaunting the power she obviously has—and thus saving face for the subordinate. If men often mishear women's ritual indirectness as lacking confidence (or even competence), women often misinterpret *less* indirect rituals as overbearing—and also lacking in confidence. Her thinking goes: he must really lack self-esteem if he has to throw his weight around like that.

Which takes us back to the woman and man in the car who have different assumptions about asking directions. From her point of view, asking directions means making a fleeting connection to a stranger and getting where you are going without losing anything. From his perspective, he would be putting himself in a one-down position to a stranger—an uncomfortable experience. He might even believe the effort is counterproductive because a stranger who does not know the way will be similarly motivated by a reluctance to appear one-down and send them on a wild-goose chase. For both reasons, it makes sense to avoid this discomfort and spend 10 minutes—or 20 or 30—finding the way on his own.

Different Styles, Similar Goals

Despite these differences, women's and men's conversational styles are more alike than they may appear. Although these styles may seem opposite, they can be used for similar purposes. Boys and men are also concerned with connection, and girls and women with power, even as they may have different ways of pursuing these goals.

Verbal rituals that focus on connection often involve affirming sameness, as we saw in the little girls' exchange about contact lenses and in the familiar responses: "The same thing happened to me" and "I'm the same way." Yet the contrasting ritual, "That's nothing! Here's what happened to me..." which is typically associated with men—and

interpreted as competitive—can also create connection, by implying, “You shouldn’t feel bad about what happened to you, because what happened to me was worse.” In other words, “topping” each other can be another way to commiserate.

Similarly, for girls and women, what appears on the surface to be aimed at connection can also be a way to exert power. Linguist Amy Sheldon of the University of Minnesota has investigated this process by videotaping preschool children playing in same-sex groups of three. She found that both boys and girls pursued their own goals, but whereas the boys she taped were obvious about thwarting another’s goals, the girls often did so in ways that appeared to honor the other girls’ goals as well. In one example, two girls, Eva and Kelly, were not eager to include the third girl, Tulla, in their play. Instead of telling Tulla outright that she could not play, they included her but assigned her a role that precluded her participation: “You can be the baby brother, but you aren’t born yet.” Sheldon emphasizes that this is a highly assertive move, even as it maintains the appearance of accommodating Tulla’s wish to be part of the game.

In this instance, the children’s behavior is not a clear on-or-off application of hierarchy or connection but a blending of both. We could say that Eva and Kelly exercised power to keep Tulla from participating but also honored the connection by assigning her a role. In contrast, Sheldon observed that when boys played, they tended to insist more overtly on their own goals and even to threaten physical force. For example, when one boy, Nick, wanted to cut a plastic pickle that another boy had, he screamed, “I *have* to cut! I want to cut it! It’s mine!” Sheldon stresses, however, that although boys and girls tended to use more of one strategy or another, the difference was not absolute but of degree. Boys did sometimes attempt to compromise, and girls did at times attempt physical force to get their way.

Sheldon’s research reminds us that patterns, no matter how real, are never absolute. Again, the asking-directions example is instructive. I didn’t realize how common that scenario is because my husband does stop and ask directions, whereas I am the one who says, “I’d rather find it myself on the map.” In this respect, he and I are not typical, as many of us

are not typical of our genders, cultures, regions or any other group to which we belong.

Gender differences are a matter of relative *focus* on connection and hierarchy, as we all want to accomplish both goals to some extent. We are always engaged in negotiations over connection and relative power. Eva and Kelly served both goals when they included Tulla—and kept her from participating. Similarly, the boys who verbally competed about how high they could hit a ball also created connection by agreeing on the type of verbal game to play. To understand gender patterns, then, rather than asking, “Does this way of speaking serve hierarchy or connection?” we need to ask, “How does this way of talking reflect the interplay of connection and hierarchy?” And nowhere can this interplay be better explored than in the context that is both universal and fundamental: the family.

Family Ties

Family comes with built-in hierarchy as well as built-in connection. The hierarchy between parents and children is selfevident, but the same is true of siblings. Even though we use the phrases “like sisters” or “like brothers” to describe friendships that are close and equal, actual sibling relationships are defined not only by the connection of shared family but also by the hierarchy of birth order. I have been particularly intrigued by sisters—not only because I have two, but, most important, because in sisters we see a relationship between women that is deeply competitive and hierarchical.

In *Having Our Say*, the Delany sisters’ 1993 best-selling memoir, Bessie Delany is quoted as saying, “Sadie doesn’t approve of me sometimes. She looks at me in that big-sister sort of way.” When she said this, Bessie was 101, and Sadie was 103. Elsewhere in the book, Sadie says, “If she lives to 130, I’ll just have to live to 132, so I can take care of her.” Their relationship was shaped more by the two years separating them than by the century they had lived.

These centenarians’ comments reflect dynamics I heard from many of the more than 100 women I interviewed about their sisters for my book *You Were Always Mom’s Favorite!: Sisters in Conversation Throughout*

Their Lives, as well as comments I have heard about brothers: older siblings were often seen as protective but also judgmental. After all, these qualities are two sides of the same coin. “Judgmental” means you see how others can improve themselves and their lives—and tell them. We all often think of ways our friends, relatives and even strangers could do things better. But we usually don’t tell them what we think—unless we feel responsible for them. Parents often come across as judgmental to children because they feel it is their right, if not their obligation, to make sure their children’s lives go as well as possible, which means letting them know the ways they can improve. Such offers of advice, however, no matter how well-meaning (in other words, focused on connection), are typically heard as criticism—and therefore as put-downs. The giver of advice is one-up, superior in knowledge and, by virtue of exercising the right to tell the other what to do, also superior in rank.

Similarly, many older sisters speak to younger siblings with commanding and unambiguous authority—ways of speaking that are more often associated with boys and men. One woman told me when she was small, she and her older sister played a game they called “mop.” She was the mop. Her sister would grab her by the feet and drag her around the house, her long hair sweeping the “oor like a mop. Several other women recalled their older sisters organizing and directing plays. A typical casting setup was: “I’ll be the princess; you be the frog.” In my own family, my father overheard me ask my sister, when I was about four and she about six, “Mimi, can I play in your backyard?” Clearly, I did not question the authority that my older sister had assumed in her dealings with me.

At the same time, closeness is the holy grail of sister relationships, as it tends to be for girls and women in other contexts as well. When speaking to women about their sisters, I often heard “I wish we were closer,” but never “I wish we weren’t so close.” Their comments also generally reflected the assumption so common among women that troubles talk is critical for intimacy. Women told me they were deeply hurt to learn that a sister had kept important personal information secret. Whereas a brother (or a father) might say, “He told us when he was ready,” sisters (like mothers) often feel, “I thought we were closer than that.”

A powerful rivalry often accompanies sisterly ties—but it can take the form of competition for connection. Sisters often feel acutely competitive about who knows what about family members' secrets—or who knows what first. The *20/20* correspondent Juju Chang, in a segment of the show based on my book, explained that she and her three sisters have learned that if one of them has important personal information to impart—news of an engagement or a pregnancy, for example—they must set up a conference call so all three sisters will learn the news at the same time. Otherwise, the sister who is called first will seem to be favored, and the others will feel slighted.

Thus, sisters are often very competitive, and hierarchy is built into their relationship by virtue of birth order. And brothers are often very close and have connection built into their relationship by virtue of shared family. Sisters and brothers tend to vie, however, for dominance in different arenas. Sisters may compete about who knows more personal information about family members, whereas brothers may compete about who knows more facts about impersonal information such as computers or history.

Family relationships make clear that closeness is not opposite or even distinguishable from hierarchy and competition. Indeed, one reason that older sisters feel so comfortable bossing younger ones around and giving them advice is precisely because there is a strong connection between them. In addition, the deep love between older and younger siblings, like that between parents and children, results in part from the acts of caretaking and the experience of being taken care of that these roles entail.

Listening in on conversations among family members reveals a unique blend of authority and intimacy in talk among women as well as among men. It highlights the ways in which gendered conversational patterns can be different routes to the same goal: finding the right balance of closeness and distance while simultaneously negotiating relative power.

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Student Surveys Contradict Claims of Evolved Sex Differences

by J.R. Minkel

For more than three decades evolutionary psychologists have advanced a simple theory of human sexuality: because men invest less reproductive effort in sperm than women do in eggs, men's and women's brains have been shaped differently by evolution. As a result, men are eager for sex whereas women are relatively choosy. But a steady stream of recent evidence suggests this paradigm could be in need of a makeover.

"The science is now getting to a point where there is good data to question some of the assumptions of evolutionary psychology," says social psychologist Wendy Wood of the University of Southern California (U.S.C.).

The eager males–choosy females paradigm doesn't imply that men and women literally make conscious decisions about how much effort they should put into short- and long-term mating relative to their costs of reproduction—minutes versus months. Instead the idea is that during human history, men and women who happened to have the right biochemical makeup to be easy and choosy, respectively, would leave more offspring than their counterparts.

In 1993 psychologists David Buss and David Schmitt, then at the University of Michigan at Ann Arbor, used that idea to generate a series of predictions about men's and women's sexual behavior. As part of their study, Buss and Schmitt surveyed college students about their desire for short- and long-term mates (that is, one-night stands versus marriage partners), their ideal number of mates, how long they would have to know someone before being willing to have sex, and what standards a one-night

stand would have to meet. In all categories the men opted for more sex than the women.

Although the study has been cited some 1,200 times, according to Google Scholar, there were “huge gaps from what I’m used to as a scientist,” says Lynn Carol Miller of U.S.C. Miller says that in order to evaluate the relative proportion of mating effort devoted to shortand long-term mating in the two sexes, the proper method is to use a scale such as time or money, which has the same interval between units, not the seven-point rating scale that Buss and Schmitt used.

In a study to be published in the journal *Sex Roles: A Journal of Research*, Miller and her colleagues carried out their own version of Buss and Schmitt’s work, asking how much time and money college students spent in a typical week pursuing short-, intermediate- or long-term relationships. The proportion of mating effort dedicated to short-term mating was the same for men and women. Similarly, both men and women showed an equivalent tendency to lower their standards for sex partners, and men did not report feeling constrained to have far fewer sexual partners than they truly desired.

“I’d certainly accepted the idea that men pursue purely sexual relationships with greater fervor than women do,” says Paul Eastwick of the Texas A&M University in College Station. “This is the first time I’ve seen data that makes me think, ‘Hmm, I wonder if that sex difference isn’t so robust.’” Miller says the results are to be expected if paternal investment boosted the survival rate of offspring during our species’ 200,000-year history. If both sexes invest in their offspring’s survival, she says, they should both show similar mating adaptations.

As a corollary to male eagerness for sex, men are also supposed to be bothered more by sexual infidelity than emotional infidelity, because men have a vested interest in making sure their offspring are their own and not another man’s. Surveys have indeed found that in the U.S. and several other industrialized countries more men than women express greater concern with sexual infidelity than with emotional infidelity (falling in love with someone else). But another recent study suggests jealousy patterns could have something to do with glitches in people’s ability to form secure relationships.

Psychologists Kenneth Levy and Kristen Kelly of The Pennsylvania State University surveyed 416 undergraduates to see which type of jealousy bothered them more. They also assessed the students' so-called attachment styles. Previous studies had found that more men than women have what's called a "dismissing avoidant" style in relationships, meaning they tend to deny their emotions and their need for the other person.

When Levy and Kelly broke down their jealousy results by attachment style, they found that men and women who had secure attachment styles were both more likely to view emotional infidelity as more upsetting than a sexual affair. Men with the dismissing style were more bothered by sexual infidelity, but women who manifested this style were also, although the effect was more pronounced in the males.

Levy says attachment styles are largely determined by early experiences with caregivers—usually mom and dad. To explain why more men than women exhibit the dismissive style, he says, "we would have to hypothesize that men are more likely to be raised in such a way that would promote dismissive attachment."

Beyond simply poking holes in the standard evolutionary psychology narrative, researchers have another paradigm ready to put in its place: U.S.C.'s Wood and Alice Eagly of Northwestern University propose that men and women adapt their outlooks to fit their society's division of labor between the sexes, which results from physical differences in size, strength and mobility (during pregnancy).

In a 2009 study Eagly, along with Eastwick and another colleague asked college students of both sexes to imagine themselves as either a future homemaker or provider. Students who imagined being homemakers rated their anticipated spouse's provider qualities as more important than that spouse's homemaker qualities. The finding fits with data indicating that women and men who earn more are more likely to get married, suggesting they make more attractive partners.

"In more equal actual roles, men and women have more similar mate preferences," Eagly says. "In very different marital roles that confine women to a domestic role, men and women choose differently."

The evidence, however, does not move Buss, now at the University of Texas at Austin. He calls Eagly and Wood's theory "bizarre" for positing that "natural selection has shaped sex differences in male and female bodies, but not in male and female brains and the psychological adaptations those brains contain."

In Wood's view the traditional evolutionary psychology paradigm was attractive because it explained the pattern of sex differences people saw around them in a way that made those differences seem natural. It assumed that men and women have always interacted in the way they do now. "We would say that men and women have evolved to act in a lot of different ways," Wood says. "We're the ultimate flexible species."

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Men Value Sex, Women Value Love?

by Andrea Anderson

Jealousy can be devastating to a relationship—and it is well known that the genders experience the green-eyed monster in different ways. Men are more likely to be jealous of sexual peccadilloes and women of emotional infidelity, according to past research. The oft-quoted evolutionary explanation is that men care more about sex because an unfaithful partner could mean raising someone else's kids, whereas women are protective of emotional attachments because the biggest danger for them is being left alone with the burden of single parenthood. But a new study from Pennsylvania State University suggests it may be time to rethink why the genders respond differently to each indiscretion.

In a study of more than 400 people, clinical psychologists Kenneth Levy and Kristen Kelly found that individual personality differences—which stem from a person's childhood experiences—explain the genders' jealousy patterns. The pair asked subjects what would be more upsetting: their partner having sex with someone else or forming a strong emotional bond with another person. Both men and women with a kind of insecure attachment called dismissing—typical of people who had inconsistent or insensitive parents and learned to shun intimacy and become “hyperindependent”—were the most likely to report being jealous of sexual infidelity. More men than women have a dismissing attachment style. The reason for this gender difference is unclear but may relate, in part, to cultural notions of what constitutes “manly” behavior. Levy says this understanding of personality formation, known as the attachment model, seems to explain both the average differences between men and women in what makes them most jealous, as well as the previously unexplained fact that a subset of individuals better fits the jealousy profile of the opposite sex.

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SECTION 2

Dating in the Modern World

Dating in a Digital World

by Eli J. Finkel, Paul W. Eastwick, Benjamin R. Karney, Harry T. Reis
and Susan Sprecher

Romantic relationships can begin anywhere. When Cupid's arrow strikes, you might be at church or at school, playing chess or softball, flirting with a friend of a friend at a party or minding your own business on the train. Sometimes, however, Cupid goes on vacation, or takes a long nap, or kicks back for a marathon of Lifetime original movies. Instead of waiting for the capricious arrow slinger to get back to work, people are increasingly joining online-dating sites to assert some control over their romantic lives.

For millennia cultures have invented practices to fulfill the evolutionary imperatives of mating and reproduction. In the Western world today, individuals are largely expected to identify romantic partners on their own, a process that can consume significant time, effort and emotional energy. The ability to hunt for dates online offers singles a modicum of control over a seemingly random process and grants them access to hundreds, potentially thousands, of eligible mates.

The unprecedented opportunity to pursue romance beyond one's social circles and neighborhood haunts has developed into a billion-dollar industry. Most online-dating sites work in this way: users create profiles describing themselves and then search a Web site for possible romantic partners according to various criteria—within a town or city, for example, or perhaps by educational levels, age range or religion. Some sites attempt to play the role of matchmaker and use proprietary algorithms to suggest pairings between users, whereas other services give their customers free rein. Our best estimate is that online dating will launch 20 to 25 percent of new romantic relationships.

Two decades ago almost no couples met online, whereas now it is the second most common way to find a partner, trailing slightly behind connecting through friends. Rather than dabbing on perfume or cologne and preparing for a night on the town, singles can peruse potential partners while drinking their morning cup of coffee, during meetings at work or when lying in bed for 10 minutes before nodding off. In short, online services have fundamentally altered the dating landscape.

The changes are not all constructive, however. Critical assumptions lurk in the mechanisms of online dating. One supposition is that people are good judges of which qualities described in an online profile will appeal to them in person. A second premise is that comparing multiple potential partners side by side is an effective way to evaluate compatibility. A third is that having many options allows people to make good decisions about their romantic future. Several lines of scientific work suggest that none of these guesses is likely to be true.

This disconnect between the assumptions underlying online dating and the realities of human psychology often yields dissatisfaction. Users may invest tens of hours every month in browsing profiles and only rarely arrange a date. They may contact dozens of users and hear back only from a small fraction of them. They may set up dates with individuals who seem perfect “on paper” only to learn on the first date that as a pair they have no chemistry.

For online daters, what follows is a survival guide. For others, a look at today’s dating methods offers revealing insights into the human psyche.

Set Limits for Yourself

Online dating is almost nothing like a typical night out on the prowl. At a bar, a man might size up the room before letting his gaze settle on the thirtysomething brunette with the welcoming smile and the serious eyes. If he approached her and managed to strike up a conversation, he could take in her nonverbal cues—such as her gestures, posture and scent—as he tried to make her laugh.

If he were instead reading her profile on an online-dating site, he would have learned that she plays board games on the weekends, works as a

pastry chef and loves horror movies. A connoisseur of art-house films, he might have already dismissed her for her questionable taste.

With the carrot of romance always dangling a mere mouse click away, the temptation to scan—and cavalierly dismiss—dozens of profiles is strong. We all value having options, but too many can produce choice overload, undermining our ability to make good decisions. In a famous illustration of this effect, supermarket shoppers encountered a tasting booth that displayed either six or 24 flavors of jam. Although shoppers were more likely to stop at the display with the larger array of jams than the booth with the smaller selection, they were 10 times more likely to purchase an item from the smaller group than the larger. Presumably the larger array paralyzed them with indecision.

Similarly, several studies in the romantic domain suggest that people become overwhelmed as the number of online-dating profiles they browse grows larger. In a recent study, participants viewed either four or 20 such profiles. Those considering the larger set were more prone to misremembering information in them. In a second experiment, as the number of profiles grew from four to 24 to 64, users increasingly switched from time-consuming choice strategies that attend to and integrate multiple cues to more frugal strategies that examine few elements and do not combine them effectively.

No studies have investigated how satisfied online daters are with their choices after considering small versus large numbers of profiles, but other research suggests that exposure to numerous options leads to low satisfaction with a given choice. Those who selected one chocolate out of six, for example, thought the treat tasted significantly better than did participants who picked their chocolate from an array of 30. By analogy, online daters choosing from a small rather than a large batch of potential partners are more likely to enjoy the person with whom they end up sharing a candlelit dinner.

These cognitive biases are hard but not impossible to counteract. Remain aware of how many profiles you have scanned in a browsing session and impose a time limit. View profiles in manageable clusters and consider reaching out to, say, one out of every 20 users. Keep in mind that

behind the profile is a flesh-and-blood person, with nuance and depth that is easily lost online.

Monitor Your Mind-set

People also tend to evaluate romantic prospects differently depending on how they encounter them. Many studies in nonromantic domains have demonstrated that people frequently prioritize different qualities when they compare multiple options side by side—referred to as a joint evaluation mind-set—than when they size up one specific possibility in isolation, known as a separate evaluation mind-set.

A study of incoming college freshmen explored this idea in the context of their dormitory assignments. Before learning which one of 12 dormitories they would be randomly assigned to, the students tended to predict that physical features, such as the building’s location and the size of its rooms, would strongly influence their future happiness. None of these attributes ultimately predicted their well-being. Instead experiential qualities—such as the relationship with one’s roommate and the social atmosphere of the dormitory—trounced any of the lodgings’ physical characteristics.

One explanation for this discrepancy between expectation and reality is that the freshmen were in a joint evaluation mind-set when making the predictions and in a separate evaluation mind-set when living in the assigned dorm. Before moving in, they were more sensitive to unimportant physical variations simply because those differences were easy to judge. Browsing profiles of potential romantic partners is also likely to trigger a joint evaluation mindset and cause users to overvalue qualities that are easy to assess but unlikely to determine compatibility. Indeed, profiles are chock-full of details that tend to be largely unrelated to the hard-to-discern, experiential characteristics that promote relationship well-being. Levels of education or physical attractiveness can be easily assessed through a profile, for example, whereas rapport and attraction are best evaluated face-to-face.

Engaging in joint evaluation can also strengthen so-called assessment mind-sets and undermine locomotion mind-sets. When in an assessment mindset, a person critically evaluates a specific option against available

alternatives. A person in a locomotion mind-set focuses on a certain selection, such as a desirable mate, and pursues it vigorously. To be sure, all dating involves some degree of assessment. The side-by-side evaluation of countless online-dating profiles, however, seems to invoke a strong assessment mind-set regarding the general pool and a weak locomotion mind-set with respect to any single person. One way to ward off a problematic mind-set is to take a moment to imagine what it might be like to talk to any profilee face-to-face. Mentally simulating a social interaction is likely to make you less critical and more motivated to consider possible ways you might be compatible. As with managing choice overload, do not waste time comparing a profile with too many others.

Cast a Wide Net

Studies suggest that online daters typically aim too high. They contact the most objectively desirable individuals at massively higher rates than others. In a real-world dating scenario, attendees at a party would not all strive to mob one attractive individual, which is effectively what happens online, because these daters cannot see how much attention a person is already receiving. These highly soughtafter people are the least likely to respond to e-mails, and both the deluged daters and the pursuers can experience frustration as a result.

Part of the problem appears to stem from the attitudes that daters adopt, intentionally or not, when on these sites. In one 2010 study Rebecca Heino of Georgetown University and her colleagues described online dating as “relationshopping.” The metaphor of shopping is apt. Much like hunting for size 8 leather shoes on Zappos.com, online daters seek partners by searching through profiles using attributes such as income and hair color, as opposed to arguably more important factors, such as a sense of humor or rapport. One online dater illustrated the shopping mentality as follows: “You know, ‘I’ll take her, her, her’—like out of a catalogue.” A second online dater agreed: “I can pick and choose; I can choose what size I want, it’s like buying a car, what options am I looking for.”

This checklist mentality underscores our lack of self-knowledge when it comes to romance. In one experiment, research participants who evaluated an online dater’s written profile expressed more attraction toward a person

whose description was rigged to match their own idiosyncratic preferences. After a brief live interaction, however, the participants' ideals no longer predicted romantic interest. These experiments tell us a few things. First, daters by and large think they covet the same people. Further, we are bad at predicting what we will find attractive in real life. Last, the easy accessibility of profiles may exacerbate these tendencies by encouraging us to evaluate potential partners in an ineffectual manner.

Rather than reaching out to the most desirable people "on paper," consider looking for more idiosyncratic features that are likely to appeal to some daters more than others. More important, get away from profiles as soon as you can and do not expect too much from them in the first place. Stay openminded about whom you might end up falling for—and who might love you back.

Communicate with Care

Online-dating sites include easy methods, such as e-mail and online chat functions, for users to communicate with prospective dates. In fact, dating hopefuls must converse through one of these methods before switching to a personal e-mail account or arranging for a telephone call. If these interactions go well, the romance seekers typically agree to meet in person in short order.

Unfortunately, many matches never get the chance to blossom. One reason is that not all profiles on a site represent paying or active users. In addition, responses to initial overtures can be few and far between. In one recent study, men replied to one out of four messages they received through a dating site, and women replied to one in six. More promisingly, this study found no evidence that eager responses were a turnoff; the faster the reply, the more likely that reciprocal communication continued. If you sense a spark, don't play hard to get.

Putting some effort into the initial e-mail can also pay off. A linguistic analysis of 167,276 initial e-mails sent by 3,657 online daters revealed that the messages more likely to receive a response were characterized by less use of the pronoun "I" and of leisure words such as "movie" and by higher use of the pronoun "you" and of social-process words such as "relationship" and "helpful."

At this stage, the incipient relationship is still fragile. Do not wait too long to set up a date. Most of the pairings that start communicating outside the dating site's messaging systems meet face-to-face within a month, frequently within a week, according to two studies from 2008. Doing so is wise, as research shows that although a small amount of e-mailing or chatting online can increase attraction when two daters meet, too much of it tends to instill overly specific expectations.

Ultimately there is *something* that people must assess face-to-face before a romantic relationship can begin. Scholars are still working to identify exactly what that something is, but it appears to reside at the intersection of experiential attributes, chemistry and gut-level evaluations. Some emotional reactions could even be based on sensory experiences, such as olfaction, that cannot be gleaned any other way. Meeting in person also serves as an important reality check before intimacy progresses: people are less likely to misrepresent their observable attributes in a real-world setting as compared with online correspondence.

Don't Bet on Matching Algorithms

Several high-profile dating sites promise to match users with an especially compatible individual using a proprietary matching algorithm. Unfortunately, these companies have so far failed to offer convincing evidence supporting this claim. We encourage users to consider this limitation before investing the sometimes considerable resources required to join such services.

To their credit, dating-site algorithms can probably discern which people have an increased risk of experiencing relationship problems by assessing individual differences such as neuroticism and a history of substance abuse. Evidence that some people are better at sustaining intimacy than others is strong and unequivocal. By assessing these types of characteristics, online-dating sites can in principle screen out the relationally challenged more efficiently and effectively than a human can. This is a potentially useful service, as long as you are not one of the unlucky folks who gets eliminated.

This filtering service, however, yields far less than what algorithm-based matching sites typically promise their users. They pledge to identify

potential mates who are particularly compatible with their customers—even soul mates—a claim that is hard to swallow for two simple reasons. No matching site has mustered any scientifically compelling evidence that its algorithm is effective. Second, decades of research on relationships suggest that the most important determinants of a relationship's fate emerge only after the pair have met—factors such as the way the couple navigates interpersonal conflict, responds to unpredictable events or shares good news. Because matching sites have demonstrated insufficient ambition or creativity, their approaches are based solely on qualities of individuals that can be known prior to meeting in person. As a result, these algorithms are poorly equipped to predict whether strangers on a date will linger over dessert or quickly demand the check. Discerning whether two people will live happily ever after is even further out of reach.

Particularly exasperating is the fact that these matching sites could so easily test whether their algorithm actually works. If the proprietors would reveal their secret sauce—perhaps with patent protection from the federal government, as in the pharmaceutical industry—scientists could test its validity by randomly assigning online daters to one of four experimental conditions. In the wait-list control group, participants would experience no intervention. A placebo-control group would consist of subjects who believe they are being matched by the site's algorithm but are actually matched at random. Daters in a relationship-aptitude control group would be paired with people who tend to be good at relationships in general and are not, say, especially neurotic. Last, individuals in an algorithm group would view profiles selected by the site's matching technology.

If the members of the fourth group experienced romantic outcomes superior to those of the participants in the other three groups, then we would have evidence that the algorithm is effective. Given that we have repeatedly spelled out how matching sites could demonstrate their value, it seems suspicious than no site has done so—or allowed independent scholars to perform the study on its behalf. Until matching sites that claim to use science actually conduct minimally adequate experiments, online daters should think twice before paying a premium for such services.

Know What Works

Some aspects of online-dating services are marvelous. They open up access to potential sources of romance that might never otherwise be available to their clients. They can transcend geographic and social-network boundaries to an unprecedented degree. These benefits may be especially powerful for those people who need it the most—including those who are socially anxious, have struggled to find like-minded partners or have recently moved to a new city.

Even though our decision making falters under trying conditions, it is worth noting that we are actually quite skilled at deducing certain personality characteristics from sparse amounts of information. Past research demonstrates that people can accurately assess a broad range of facts about others based on a brief exposure to their photographs. For example, when study participants viewed snapshots of the faces of chief executive officers from Fortune 1,000 companies, their ratings of those CEOs' leadership ability correlated strongly with the companies' profits. What people cannot discern from an image, however, is how compatible they might be with the individual pictured. This capability also so far eludes online-dating sites, unfortunately.

In general, however, online-dating sites present a unique opportunity to bring happiness into the world. The industry is still in its infancy, which is probably one reason it contains so many flaws. As these services increasingly incorporate the best relationship science, they will evolve and improve. When wielded with skill and rigor, these tools can help millions of lonely hearts find love.

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The Truth about Online Dating

by Robert Epstein

Several years ago I arranged to meet for coffee with a woman I had corresponded with online. I arrived early and sat at a table in a conspicuous spot. After a few minutes, a woman came to my table, sat down and said with a big smile, “Hi, I’m Chris!”

But Chris was not the woman in the online photographs. This wasn’t a question of an age discrepancy or a new hairdo. She was a completely different woman. Chris was in marketing, you see, and to her it was simply a good strategy to post photographs that would draw in as many “customers” as possible. I never said a word about the photographs. I just enjoyed our conversation and the refreshments. A few weeks later I noticed that Chris had replaced the photographs with those of yet *another* woman.

In the U.S. alone, tens of millions of people are trying to find dates or spouses online every day. How accurate are the ads they find? And just how successful is online dating compared with conventional dating? These and other questions have recently stimulated a small explosion of studies by social scientists. The research is quickly revealing many surprising things about the new world of online dating, and some of the findings could be of great value to the millions who now look to the Internet to find love.

Deception at Light Speed

Experiences such as the one I had with Chris are multiplying by the thousands: some people online lie quite drastically about their age, marital or parental status, appearance, income or profession. There are even Web sites, such as www.DontDateHimGirl.com, where people go to gripe, and a

few lawsuits have been filed against online services by disgruntled suitors. Just how bad is deception in online dating?

To put this issue in context, bear in mind that deception has always played at least a small role in courting. One could even argue that deception is a *necessary* part of wooing a potential partner (“Yes, I *love* sports!”) and even of forming successful longterm relationships (“No, that dress doesn’t make you look fat at all!”).

But cyberspace introduces a host of new possibilities. Survey research conducted by media researcher Jeana Frost, then at Boston University and the Massachusetts Institute of Technology, suggests that about 20 percent of online daters admit to deception. If you ask them how many *other* people are lying, however—an interviewing tactic that probably gets closer to the truth—that number jumps to 90 percent.

Because self-reported data can be unreliable, especially those from people asked to confess bad things about themselves, several researchers have sought objective ways to quantify online deception. For example, psychologist Jeffrey Hancock of Cornell University and communications professor Nicole Ellison of Michigan State University bring people into a lab, where they measure height and weight and then check the numbers against those in their online profiles. The preliminary data suggest that, on average, online profiles shave off about five pounds and add perhaps an inch in height. According to Ellison, although deception is “fairly common, the lies are of a very small magnitude.” On the other hand, she says that the shorter and heavier people are, the bigger the lies.

In another attempt to collect objective data on deception, economists Guenter Hitsch and Ali Hortaçsu, both at the University of Chicago, and psychologist Dan Ariely of M.I.T. compared the heights and weights of online daters with the same statistics obtained from national census data. Like Hancock and Ellison, they found that online height is exaggerated by only an inch or so for both men and women but that women appear to underestimate their weight more and more as they get older: by five pounds when they are in their 20s, 17 pounds in their 30s and 19 pounds in their 40s.

For men, the major areas of deception are educational level, income, height, age and marital status; at least 13 percent of online male suitors are thought to be married. For women, the major areas of deception are weight, physical appearance and age. All of the relevant research shows the importance of physical appearance for both sexes, and online daters interpret the absence of photographs negatively. According to one recent survey, men's profiles without photographs draw one-fourth the response of those with photographs, and women's profiles without photographs draw only one-sixth the response of those with photographs.

If you are a Garrison Keillor fan, you have probably heard about the fictional Lake Wobegon on public radio, where "all the women are strong, all the men are good-looking, and all the children are above average." In the online dating community, similar rules apply: in one study, only 1 percent of online daters listed their appearance as "less than average."

Rationale for Falsehoods

Why so much inaccuracy? One theory, formulated in the late 1980s and early 1990s by Sara Kiesler and her colleagues at Carnegie Mellon University, suggests that by its very nature "computermediated communication" is disinhibiting, causing people to say just about anything they feel like saying. Because people typically use screen names rather than real ones, their ramblings are anonymous and hence not subject to social norms. There are also no physical cues or consequences—no visible communication gestures, raised eyebrows, grimaces, and so on—to keep people's behavior in check. As a result, online daters tend to construct what Ellison and her colleagues Jennifer Gibbs of Rutgers University and Rebecca Heino of Georgetown University call an "ideal self" rather than a real one. A study published recently by Ellison and her colleagues even suggests that online daters often regret it when they do tell the truth, feeling that too much honesty, especially about negative attributes, creates a bad impression.

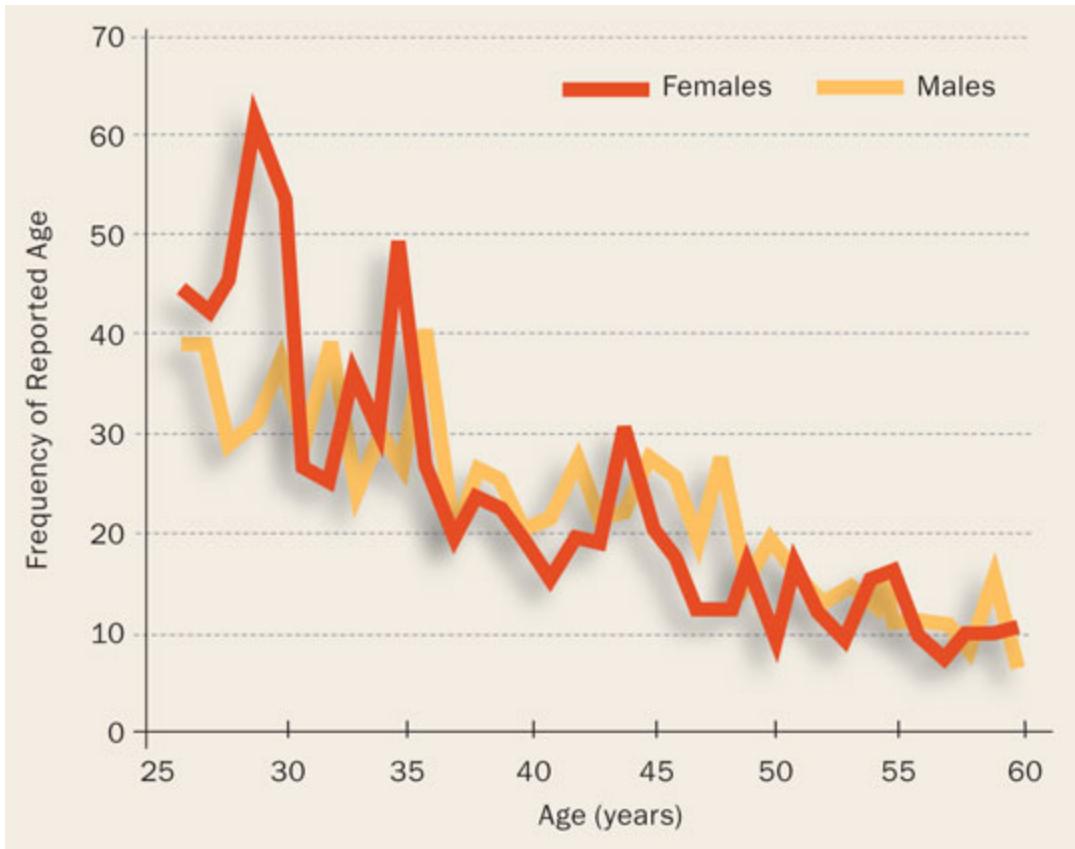
There are also straightforward, practical reasons for lying. One recent study showed that men claiming incomes exceeding \$250,000 got 151 percent more replies than men claiming incomes less than \$50,000, for example. Many women are quite open about listing much younger ages, often stating in the text of their profiles that they have listed a younger age

to make sure they turn up in searches. (Because men often use age cutoffs in their searches, women who list ages above that cutoff will never be seen.)

My research assistant Rachel Greenberg and I have examined the age issue by plotting a histogram of the ages of 1,000 men and 1,000 women selected at random from the national database of Match. com, arguably now the largest of the online matchmaking services. (The company's Web site claims to have 15 million members, at the time of writing, with 20,000 people joining every day.) We speculated that from age 29 on—the point at which people in our culture tend to become sensitive about growing older—we might see some distinctive patterns in the distribution of ages. For men, a small spike appeared in the distribution at 32 and a large one at 36. The number of men calling themselves 36 was dramatically higher than the average frequency of men between the ages of 37 and 41.

Lying about Age

Suspicious spikes in ages in a random sample of 1,000 female and 1,000 male profiles from Match.com suggest that online daters lie about their ages. The curve for males has a small spike at age 32 and a larger one at age 36. The number of men claiming to be 36 is 84 percent higher than the average frequency of men claiming to be between ages 37 and 41—a difference more than seven times larger than could be expected by chance. For women, three clear spikes occur at ages 29, 35 and 44. The difference between the number of women claiming to be 29 and the average frequency of women claiming to be between the ages of 30 and 34 is nearly eight times larger than could be expected by chance. The difference between the number of women claiming to be 35 and the average frequency of women claiming to be between ages 36 and 43 is more than five times larger than could be expected by chance.



Credit: Robert Epstein

For women, we found three clear age spikes at 29, 35 and 44. The difference between the number of women claiming to be 29 and the average frequency of women claiming to be between ages 30 and 34 was nearly eight times larger than we would expect by chance. Apparently women at certain ages are reluctant to reveal those ages—and certain numerical ages are especially appealing, presumably because our culture attaches less stigma to those ages.

Tests That Fail

I have been a researcher for about 30 years and a test designer for nearly half those years. When I see extravagant ads for online tests that promise to find people a soul mate, I find myself asking, “How on earth could such a test exist?”

The truth is, it doesn’t.

For a psychometric evaluation to be taken seriously by scientists, the test itself needs to clear two hurdles. It needs to be shown to be reliable—

which means, roughly, that you can count on it to produce stable results. And it needs to be shown to be a valid measure of what it is supposed to be measuring. With a test that matches people up, such validity would be established by showing that the resulting romantic pairings are actually successful.

Criteria for establishing test reliability are quite rigorous. Once relevant data are collected, the results are typically submitted to the scientific community for scrutiny. A peer-reviewed report (one vetted by other knowledgeable researchers in the field) is ultimately published in an academic journal.

Several online services are now built entirely around claims that they have powerful, effective, “scientific” matchmaking tests—most notably eHarmony.com, promoted by clinical psychologist Neil Warren; PerfectMatch.com, promoted by sociologist Pepper Schwartz of the University of Washington; and Chemistry.com (a recent spin-off of Match), promoted by anthropologist Helen Fisher of Rutgers. But not one of the tests they offer has ever been subjected to the type of outside scientific verification that I have described.

Why would a major company such as eHarmony, which claims to have attracted 20 million members since its inception, *not* subject its “scientific, 29-dimension” test to a scientific validation process? In 2004 eHarmony personnel did present a paper at a national convention claiming that married couples who met through eHarmony were happier than couples who met by other means. Typically such a paper would then be submitted for possible publication in a peer-reviewed journal. But this paper has still not been published, possibly because of its obvious flaws—the most problematic being that the eHarmony couples in the study were newlyweds (married an average of six months), whereas the couples in the control group (who had met by other means) were way past the honeymoon period (married an average of 2.1 years). (Personnel at eHarmony, including its founder, Neil Warren, did not respond to requests to be interviewed for this article.)

eHarmony claims that, on average, 236 of its members marry every day in the U.S. as a result of its services. But that figure is not as impressive as it might sound. In 2005, using eHarmony’s own published statistics, a

team of credible authorities—among them Philip Zimbardo, a former president of the American Psychological Association—concluded in an online white paper: “When eHarmony recommends someone as a compatible match, there is a 1 in 500 chance that you’ll marry this person.... Given that eHarmony delivers about 1.5 matches a month, if you went on a date with all of them, it would take 346 dates and 19 years to reach [a] 50% chance of getting married.” The team also made the sweeping observation that “there is no evidence that . . . scientific psychology is able to pair individuals who will enjoy happy, lasting marriages.”

Think about how difficult this task is. Most online matching is done, for example, by pairing up people who are “similar” in various respects. But you do not need to look farther than your own family and friends to know that similarity is not always a good predictor of success in a relationship. Sometimes opposites really do attract. How could an online test possibly determine whether you should be paired with someone similar or with someone different, or with some magic mix?

And even if validated predictive tests eventually appeared online, how could such tests possibly predict how two people will feel when they finally meet—when that all-important “chemistry” comes into play? Oddly enough, eHarmony does not even ask people about their body type, even though research shows unequivocally that physical appearance is important to both men and women.

But the biggest problem with online testing is the “false negative problem.” A test that determines in advance whom you might meet and whom you will *never* meet necessarily fails to allow certain people to meet who would adore each other. The good news, though, is that according to psychologist Larry D. Rosen of California State University, Dominguez Hills, “In our studies only 30 percent of the people say they use [online tests] at all, and most of those people find them ridiculous.”

High Hopes and Poor Odds

Advertising materials from the largest online dating services—Match, eHarmony, True and Yahoo! Personals—suggest that more than 50 million Americans are using such services (assuming relatively little overlap in

membership) and that satisfaction levels are high. But recent independent studies suggest that only 16 million Americans were using online dating services by late 2005 and that satisfaction levels were low. Based on a phone survey with more than 2,000 people, Jupiter Research reports that “barely one quarter of users reported being very satisfied or satisfied with online personals sites.” Another extensive survey conducted by Pew Internet & American Life Projects suggests that 66 percent of Internet users think that online dating is a “dangerous activity.”

According to Trish McDermott, a longtime spokesperson for Match and subsequently an executive at Engage.com, the confusion over membership figures results from the fact that while a large company such as Match might advertise that it has 15 million members, less than a million are actually paying customers. The others have full profiles online—an important marketing draw—but cannot respond to e-mails. This is one of several reasons, according to McDermott, why many paying members get frustrated by a lack of response to their e-mails; the vast majority of people in the profiles simply *cannot* respond.

One of my greatest concerns about online dating has to do with what I call “the click problem.” We already have a commitment problem in America, one of several reasons why roughly half of first marriages and about two thirds of second marriages here end in divorce. Online dating probably is making things worse.

No matter what Hollywood tells us, long-term relationships take patience, skill and effort. In cyberspace, unfortunately, the bar is so long and the action so quick that few people are willing to put up with even the slightest imperfection in a potential mate. If someone is the wrong height or wears the wrong shoes or makes the wrong kind of joke, he or she is often dismissed instantly. After all, it is a simple matter to go back and click, with tens of thousands of potential mates ready to fill the void.

Virtual Dating and More

These many problems notwithstanding, the future of online dating and matchmaking looks bright. Interest is growing quickly, and intense competition will force rapid changes in the kinds of services that are offered. In 2001 online dating was a \$40-million business; by 2008 that

figure was expected to reach \$600 million, with more than 800 businesses vying for every dollar.

The online dating model is already developing. Phase one—the Long Bar—is exemplified by companies such as Match, True and Yahoo!Personals. Phase two—the Long Test—is the bread and butter of companies like eHarmony and PerfectMatch. But phase three is already well under way.

Engage, for example, allows members to bring friends and family with them online, all of whom can prowl the profiles, checking people out and matching them up. Members can also rate the politeness of their dates, as well as the accuracy of the profiles. This is the new “community” approach to online matching—a naturalistic, social corrective for the deception that plagues cyberspace. The community approach is also evident in the sprawling new social-networking sites such as Facebook, Friendster and MySpace; MySpace alone has more than 100 million members. Although the socialnetworking sites appeal mainly to young users and are not strictly dating sites, they bring the community back into whatever dating is generated there. On mega dating sites such as eHarmony and Match, dating is done in complete social isolation, a matter of great concern to Ellison and other researchers in this area.

And the next step in online dating—“virtual dating”—is already being developed. Using special software developed by the M.I.T. Media Lab, researchers Frost, Ariely and Harvard University’s Michael I. Norton reported that people who had had a chance to interact with each other (by computer only) on a virtual tour of a museum subsequently had more successful face-to-face meetings than people who had viewed only profiles. One major bonus: virtual dating takes care of the safety concerns that prevent many people from meeting in person.

Take this just a small step forward: people meeting and chatting in a romantic virtual cafe on the Champs-Élysées in Paris—seeing and hearing each other online as they interact in this beautiful setting. Andrew Fiore, a doctoral candidate at the University of California, Berkeley, who studies online dating, suggests that in a few years we will even be able to add physiological signs to the experience—the sound of your date’s heartbeat, perhaps?

Add community-based matchmaking to enriched virtual dating, and we have turned the Internet into the greatest yenta the world has ever known.

Ten Commandments for Online Lovers

>> BE VAGUE. The more information you provide, the poorer the impression you will create, shows research by psychologist Michael I. Norton of Harvard University, media researcher Jeana Frost, then at Boston University and the Massachusetts Institute of Technology, and psychologist Dan Ariely of M.I.T. People mistake vagueness for attractiveness, filling in the missing details in ways that suit their own desires.

>> BE ENTHUSIASTIC. When psychologist Larry D. Rosen of California State University, Dominguez Hills, asked women to choose between men who sent neutral e-mails (“I like my job”) versus enthusiastic e-mails (“I love my job!”), three quarters of the women said they preferred the latter.

>> HAVE COFFEE. If you think there is some potential for a relationship, move swiftly to arrange a brief, safe, face-to-face encounter. The volumes of information you get in such a meeting in just a few minutes quickly override any other impressions you might have formed in multiple e-mails or even phone calls.

>> DON'T PAY. Avoid high month-to-month fees—or any fees, for that matter—by looking for free membership deals or joining one of the gratis social-networking sites. Beware the “pay to respond” sites that allow you to sign up without paying but then charge you before you can respond to any e-mails.

>> FORGET THE TESTS. Until scientifically validated, predictive tests are available online, don’t waste your time or money on sites offering to find your soul mate through testing. At this point, no one knows how to do such matching, no matter what the hype. And even if such tests do appear someday, remember the problem of “false negatives”: the test might mistakenly steer you away from your perfect mate.

>> DON'T GET HOOKED. The online dating environment is so huge that one can easily spend hours every day sending out emails, replying to those received and searching profiles. Unfortunately, almost none of that activity leads to a relationship or even to a phone call. Try to limit your online dating activities to no more than a few minutes a day—and don’t forget about the real-world alternatives: join a club or take classes.

>> BE HONEST. Although a certain amount of deception is normal in any dating experience, dishonesty ultimately back-fires. It is important to present yourself in the best possible light, but do not get carried away.

>> MAKE CONTACT. Research by communications expert Andrew Fiore of the University of California, Berkeley, shows that the best predictor of how many e-mails people receive is how many they send. If you really want to find someone, don’t just sit there. Initiate contact and also respond to the interesting messages you receive.

>> INVOLVE YOUR FRIENDS. Look for online services that allow friends and family members to come online with you—preferably free of charge—and let them help you find your mate. To be healthy, dating should never be done in social isolation.

>> BE PATIENT. With advertisements making extravagant promises and millions of people available to you at the click of a mouse, your expectations are bound to be high. But online dating is a slow, frustrating experience for most people. Expect to spend at

least three to six months, and possibly much longer, finding someone with whom you are compatible.

Credit: Robert Epstein

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Not Tonight, Dear, I Have to Reboot

by Charles Q. Choi

At the Museum of Sex in New York City, artificial-intelligence researcher David Levy projected a mock image on a screen of a smiling bride in a wedding dress holding hands with a short robot groom. “Why not marry a robot? Look at this happy couple,” he said to a chuckling crowd.

When Levy was then asked whether anyone who would want to marry a robot was deluded, his face grew serious. “If the alternative is that you are lonely and sad and miserable, is it not better to find a robot that claims to love you and acts like it loves you?” Levy responded. “Does it really matter, if you’re a happier person?” In his 2007 book, *Love and Sex with Robots*, Levy contends that sex, love and even marriage between humans and robots are coming soon and, perhaps, are even desirable. “I know some people think the idea is totally outlandish,” he says. “But I am totally convinced it’s inevitable.”

The London native has not reached this conclusion on a whim. Levy’s academic love affair with computing began in his last year of university, during the vacuum-tube era. That is when he broadened his horizons beyond his passion for chess. “Back then people wrote chess programs to simulate human thought processes,” he recalls. He later became engrossed in writing programs to carry on intelligent conversations with people, and then he explored the way humans interact with computers, a topic for which he earned his doctorate last year from the University of Maastricht in the Netherlands. (Levy was sidetracked from a Ph.D. when he became an international master at chess, which led him to play around the world and to found several computer and chess organizations and businesses.)

Over the decades, Levy notes, interactions between humans and robots have become increasingly personal. Whereas robots initially found work, say, building cars in a factory, they have now moved into the home in the form of Roomba the robotic vacuum cleaner and digital pets such as Tamagotchis and the Sony Aibo.

And the machines can adopt a decidedly humanoid look: the robot Repliee from Hiroshi Ishiguro, director of Osaka University's Intelligent Robotics Laboratory, can fool people into believing that it is a real person for about 10 seconds from a few feet away. And "it's just a matter of time before someone takes parts from a vibrator, puts it into a doll, and maybe adds some basic speech electronics, and then you'll have a fairly primitive sex robot," Levy remarks.

Science-fiction fans have witnessed plenty of action between humans and characters portraying artificial life-forms, such as with Data from the *Star Trek* franchise or the Cylons from the reimagined *Battlestar Galactica*. And Levy is betting that a lot of people will fall in love with such devices. Programmers can tailor the machines to match a person's interests or render them somewhat disagreeable to create a desirable level of friction in a relationship. "It's not that people will fall in love with an algorithm but that people will fall in love with a convincing simulation of a human being, and convincing simulations can have a remarkable effect on people," he says.

Indeed, a 2007 study from the University of California, San Diego, found that toddlers grew to accept a two-foot-tall humanoid robot named QRIO after it responded to the children who touched it. Eventually the kids considered QRIO as a near equal, even covering it with a blanket and telling it "night night" when its batteries ran out. "People who grow up with all sorts of electronic gizmos will find android robots to be fairly normal as friends, partners, lovers," Levy speculates. He also cites 2005 research from Stanford University that showed people grew to like and trust computer personalities that cared about their wins and losses in blackjack and were generally supportive, much as they would respond to being cared about by other people.

The modern age of telecommunications has already made it possible to fall in love without ever having met face to face, Levy adds. "So many

people nowadays are developing strong emotional attachments across the Internet, even agreeing to marry, that I think it doesn't matter what's on the other end of the line," he says. "It just matters what you experience and perceive."

Based on what researchers know about how humans fall in love, human-robot connections may not be all that surprising. Rutgers University biological anthropologist Helen Fisher, renowned for her studies on romantic love, suggests that love seems dependent on three key components: sex, romance and deep attachments. These components, she remarks, "can be triggered by all kinds of things. One can trigger the sex drive just by reading a book or seeing a movie—it doesn't have to be triggered by a human being. You can feel a deep attachment to your land, your house, an idea, a desk, alcohol or whatever, so it seems logical that you can feel deeply attached to a robot. And when it comes to romantic love, you can fall madly in love with someone who doesn't know you exist. It shows how much we want to love."

Still, both Fisher and Levy agree that many if not most humans will continue to love and have sex the old-fashioned way. "But I think there are people who feel a void in their emotional and sex lives for any number of reasons who could benefit from robots," Levy states. He cites a Massachusetts Institute of Technology student dubbed "Anthony" in M.I.T. psychologist Sherry Turkle's book *The Second Self*, which explores human-computer interactions. Anthony tried having human girlfriends but preferred relationships with computers. Levy says that he dedicated his book "to 'Anthony' and all the other 'Anthonys' before and since of both sexes, to all those who feel lost and hopeless without relationships, to let them know there will come a time when they can form relationships with robots."

Whether those bonds are emotionally healthy, however, is debatable. As Turkle puts it: "If you are lonely but afraid of intimacy, relationships with machines can enable you to be a loner yet never alone, give you the illusion of companionship without the demands of friendship. There is nothing to celebrate here. To me, the seductiveness of relationships with robots speaks to what we are not getting from people."

Instead of throwing robots at social problems, Turkle feels humans should do the job. “What people like Anthony need are experiences that will increase their repertoire for dealing with the complexity and challenges of relationships with people,” she explains. Levy contends that there are not going to be enough people to handle social concerns such as loneliness or care for the elderly, but Turkle dismisses the idea: “If we paid people to take care of the elderly in the way we invested in other things, this wouldn’t be an issue.”

Both Fisher and Turkle find the idea of legal human-robot marriages ridiculous. But Levy counters that “if you went back 100 years, if you proposed the idea that men would be marrying men, you’d be locked up in the loony bin. And it was only in the second half of the 20th century that you had the U.S. federal government repealing laws in about 12 states that said marriage across racial boundaries was illegal. That’s how much the nature of marriage has changed.”

As to what Levy’s wife thinks, he laughs: “She was totally skeptical of the idea that humans would fall in love with robots. She’s still fairly skeptical.” A reasonable reaction—then again, a Stepford wife with contrariness programmed into her would say that, too.

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SECTION 3

Finding and Keeping Love

Changing the Dating Game

by Wray Herbert

Women are much choosier than men when it comes to romance. This is well known, but the reason for this gender difference is unclear. Evolutionary psychologists think it is because back in prehistoric times “dating” was much riskier for women. Men who made an ill-advised choice in the ancient version of a singles bar simply had one lousy night. Women who chose unwisely could end up facing years of motherhood without the critical help that a stable partner would have provided.

That is less true today, yet women remain much more selective. Is this difference a vestige of our early ancestry? Or might it be totally unrelated to reproductive risk, the result of something more modern and mundane? A couple of Northwestern University psychologists, Eli J. Finkel and Paul W. Eastwick, decided to explore this question in an unusual laboratory: a real-life speeddating event.

People in Motion

For the uninitiated, speed dating is an increasingly popular way for men and women to meet and find potential partners. Participants attend a sponsored event and go on a series of very brief “dates,” about four minutes each. Typically the women sit scattered around a room, and the men make the rounds. Afterward, both men and women indicate to the sponsor if they would be interested in seeing any of the others again. If two “yeses” match up, they get phone numbers and that’s it. They’re on their own.

Men say “yes” a lot more than women. That is expected, but Finkel and Eastwick had a novel theory about why. Perhaps it could be explained by the simple convention of men standing and approaching—and women

sitting passively. There has been a lot of recent work on the mutual influence of body and mind—how we embody our thoughts and emotions. For example, body movements can subconsciously influence people’s attitudes toward another race. In a 2007 study at York University in Canada psychologists found that nonblack participants who were trained to pull a joystick toward them when they saw a picture of a black person subsequently had fewer implicit (subconscious) biases against blacks than people who were trained to push the joystick away or to the left or right. Pulling the joystick was similar, in a psychological sense, to approaching the individuals in the pictures—and when people approach someone, their feelings about that person tend to warm.

Finkel and Eastwick speculated that in speed dating, physically approaching someone might be enough to make the potential date more appealing romantically—and thus, because men usually approach women in such events, to make the men less choosy overall.

They tested this hypothesis in a series of 15 heterosexual speed-dating events, involving 350 young men and women. Each participant went on about 12 dates, but the researchers changed the rules: in seven of the events, the women approached the men, so overall both genders approached each other about equally. After each date, the participants rated their partners for romantic desirability and romantic chemistry. They also rated their own sense of self-confidence on the date. After all the brief dates were over, they decided thumbs up or thumbs down for each candidate.

Hello, I Love You

The results were a score. As reported in the October 2009 issue of *Psychological Science*, the well-known gender difference vanished when men and women assumed more egalitarian roles—when women made the rounds and men sat, both sexes were equally choosy. This finding is not a complete reversal of the old rule, however; the seated men were not choosier than the traveling women, the way seated women are choosier than men in the traditional speed-dating setup. This suggests that the ancient tendencies still exist but may be less influential than previously thought, because they are also reinforced by arbitrary social norms such as

the convention that men usually approach women when there is potential for romance.

What's more, by asking the participants to rate their self-confidence, the researchers provided further insight into what specifically about the speed-dating setup led both men and women to be more selective when they were seated. The investigators had wondered whether the act of sitting and being approached by a long string of members of the opposite sex made people feel especially desirable and, therefore, justifiably choosier. But they found that those who rotated showed more self-confidence than those who sat, nixing the idea that the sitters' perception of being in great demand was driving their relative choosiness. Instead simply standing and being on the move boosted both genders' sense of confidence, which in turn boosted their romantic attraction to the people they approached.

We don't speed-date our way through real life, of course, but there are all kinds of social conventions based on gender, and these presumably shape romantic feelings and actions. Having men behave more like women and women more like men appears to narrow at least this one gap between the sexes.

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The Humor Gap

by Christie Nicholson

When comedian Susan Prekel takes to the stage and spots an attractive man in the audience, her heart sinks. “By the end of my gig he’s going to find me repulsive, at least as a sexual being,” she says.

In more than a decade of performing on the New York City comedy circuit the attractive, tall brunette has been asked out only once after a show. But male comics get swarmed. “They do very well with women. I see it all the time,” Prekel says.

Comedians, it turns out, may simply be experiencing an extreme version of the typical romantic interplay between men and women. Although both genders consistently prefer a partner with a sense of humor, there is an intriguing discrepancy in how that preference plays out. Men want someone who will appreciate their jokes, and women want someone who makes them laugh. The complementary nature of these desires is no accident. Researchers suspect humor has deep evolutionary roots—in 1872 Charles Darwin noticed chimps giggling as they played—and many argue that the laws of natural selection can help explain the complex senses of humor we have today.

Men and women use humor and laughter to attract one another and to signal romantic interest—but each gender accomplishes this in a different way. And as a relationship progresses, the way men and women use humor changes; it becomes a means of soothing one another and smoothing over rough patches. In fact, humor is rarely about anything funny at all; rather sharing a laugh can bring people closer together and even predict compatibility over the long haul.

Humor in all its forms—sarcastic, witty, anecdotal, ironic, satirical—is as complicated and evolved as language. It can be a weapon used to alienate and a means to communicate interest and intelligence. So at the risk of unweaving a rainbow, it's time to take a serious look at humor.

Make Me Laugh

It was when scientists started watching men and women *be* funny, in addition to studying what people *found* funny, that interesting patterns emerged. “The literature prior to the 1990s focused on joke appreciation,” says Martin Lampert, humor expert and chair of social sciences at Holy Names University in Oakland, Calif. “This was a contrived situation where subjects were presented with jokes and we documented their reaction.” Experiments then started to look at humor production, asking subjects to come up with jokes or studying how people amuse one another in the real world. “This gave us a much more accurate picture of what was happening,” Lampert says.

In 1996 Robert R. Provine, professor of psychology at the University of Maryland, analyzed 3,745 personal ads and found that women sought a mate who could make them laugh twice as often as they offered to return the favor. Men, on the other hand, *offered* humor about a third more than they requested it. These findings were the first big clue that the sexes were approaching humor from different angles.

Ten years later Eric R. Bressler of Westfield State College and Sigal Balshine of McMaster University revealed another intriguing gender difference. The psychologists showed 200 people photographs of men and women, each paired with either a funny or a fairly straight autobiographical statement. Women chose the funnier men as potential dates, but men showed no preference for the funny women (as Prekel, the comedian, has been witnessing in the real world). And yet all over the world, both sexes consistently rank a sense of humor as one of the most important traits in a mate—so why the disparity?

“Although both sexes *say* they want a sense of humor, in our research women interpreted this as ‘someone who makes me laugh,’ and men wanted ‘someone who laughs at my jokes,’ ” says Rod A. Martin of the University of Western Ontario. In 2006 Martin, along with Bressler and

Balshine, asked 127 subjects to choose between pairs of potential partners for either a one-night stand, a date, a short-term relationship, a long-term relationship or friendship. In each pair one partner was described as receptive to the participant's humor but not very funny themselves, and the other partner was described as hilarious but not all that interested in the participant's own witty remarks.

In every context other than friendship, men preferred women who would laugh at their jokes to those who made jokes. Women, however, preferred partners who were funny.

The fact that a man and a woman complement each other when they offer and request humor is striking because laughter is not under our conscious control, Provine points out. And as with many behaviors that occur outside of our awareness, researchers suspect these opposing desires may have arisen because they serve a reproductive purpose.

Why Funny Men Are So Attractive

From an evolutionary perspective, the sex that contributes more resources to the development of offspring will likely be the choosier of the two. In all mammals, that choosier sex is the female, because of the burden of pregnancy. So the male must compete for female attention—think of the courtship displays of bucks with their grand antlers. When a female is drawn to an impressive performer, she is unknowingly responding to his genetic health—thereby increasing the likelihood that her offspring will survive.

This evolutionary force is referred to as sexual selection, and psychologist Scott Barry Kaufman of New York University thinks it may explain why humor is so important in early courtship and why men produce the jokes while women appreciate them. "Humor is pretty sexy at first meeting. When you have little else to go on, a witty person who uses humor in a clever, original way is signaling quite a lot of information, including intelligence, creativity, and even aspects of their personality such as playfulness and openness to experience," says Kaufman, who has done studies on the role of creativity in humor.

Supporting this idea are studies that show that humor is a good indicator of intelligence—a highly prized, heritable trait. For instance, in 2008

Daniel Howrigan of the University of Colorado at Boulder asked nearly 200 people to create humorous statements and draw funny images. Those who scored higher on a test of general intelligence were also rated by observers as being significantly funnier.

A more subtle test of the sexual selection hypothesis for humor depends on what women want when they are at their most fertile—during ovulation. A large body of research has shown that when considering short-term partners, ovulating women tend to prefer men who have signs of good genes, such as body symmetry, masculine facial features and behavioral dominance. In contrast, when considering long-term partners at any point in their cycle, women show no preference, often choosing men with resources (in this day and age, that means money) and nurturing characteristics—in other words, good dads.

If humor is a sign of creativity and intelligence and hence an indicator of high-quality genes, funny guys should be highly desirable to women when they are ovulating. Indeed, a 2006 study by Geoffrey Miller of the University of New Mexico and Martie Haselton of the University of California, Los Angeles, showed exactly that. Forty-one women read descriptions of creative but poor men and uncreative but wealthy men and rated each man's desirability as a short-term mate. During high fertility, women chose creative men about twice as often as wealthy men for short-term pairing, but no preference emerged for long-term partners—exactly the pattern one would expect.

So if being funny is what it takes to get the girls, then making others guffaw should be a priority for guys. Think back on the class clowns you've known. Were they boys?

And while the boys were clowning, chances are the girls were giggling. Studies of laughter also reveal clues about humor's important, evolved role in courtship, as Provine discovered when he started studying spontaneous conversation in 1993. He had tried studying laughter in the laboratory, but plopping a person in front of a TV with a couple of *Saturday Night Live* episodes did not incite much hilarity. Provine came to the stark realization: laughter is inherently social. So he set out, like a field primatologist, to observe human interaction in urban spaces: malls, sidewalks, cafes. He made note of about 1,200 laugh episodes—comments

that elicited a laugh from either the speaker or the listener—and figured out which gender laughs when.

The results may not come as a surprise. Women, in general, laugh a lot more than men, according to Provine's data—especially in mixed-sex groups. "Both men and women laugh more at men than at women," Provine observes. This finding aligns with the idea that men are performing humor and women, the "selectors," are appreciating it, but of course there are other possible explanations. Are women simply less discriminating when it comes to humor? Or are men the funnier gender?

What's So Funny?

A man walks into a bar with a priest, a rabbi and a duck. The bartender looks up and says, "What is this, a joke?"

A bad one, perhaps. But telling formulaic jokes is only one of many ways to be funny. And men, it turns out, are much more likely to tell jokes than women are. Women make people laugh, too, but more often by sharing personal anecdotes. (Men: *that's what they're doing in the bathroom.*)

A glance at the funny pages makes the point. In 2007 psychologists Andrea Samson and Oswald Huber of the University of Fribourg in Switzerland analyzed cartoons from 61 countries and found that work by female artists tends to have more speaking characters than that of male artists, who are more likely to make absurd or abstract statements.

Psychologist Mary Crawford, now at the University of Connecticut, was one of the first to show this trend in real life. She surveyed each sex in 1991 and reported that men engage more with formulaic jokes, hostile humor and slapstick comedy—think of the classic Three Stooges plumbing short, rife with wrench blows to the head and dousings of water. Women, on the other hand, prefer to tell funny stories about real life—such as when Carrie of *Sex and the City* describes to her friends how her boyfriend broke up with her on a Post-it note.

The Post-it story is revealing because the event was quite sad, but it became funny in the self-deprecating retelling. Many studies show women tend to use this type of humor because it supports group solidarity—everyone can nod and think, "I've been there." Psychologist Jennifer Hay of Northwestern University noticed this trend in 2000 when she taped 18 group conversations in the lab. She reported a different style in men, who tended to tease and disparage more often—performing for the group and trying to one-up each other.

When men and women are together, however, there's a twist—the gender roles seem to reverse. Martin Lampert of Holy Names University and Susan Ervin-Tripp of the University of California, Berkeley, showed this style swap in 2006 by analyzing 59 real-life conversations. In mixed company, men teased significantly less and women teased more, specifically targeting their teasing at men. Men also tended to laugh at themselves more, whereas women became less self-deprecating. The researchers speculate that in these situations men may tone down their teasing lest they turn off a

potential mate—and women may attempt to appear less vulnerable and assert equal standing with men.

Credit: Christie Nicholson

Cracking the Laughter Code

Recent research suggests these possibilities are unlikely. Men and women are consistently judged to be equally funny when they go head to head on humor production. For instance, in 2009 Kim Edwards, a Ph.D. student in psychology at the University of Western Ontario, asked men and women to come up with funny captions for single-frame cartoons. Both genders created an equal number of highly rated captions.

In humor appreciation, too, women and men are on equal footing. In 2005 psychiatrist Allan Reiss of Stanford University showed men and women 30 cartoons while scanning their brains. Both genders rated 24 of the cartoons as funny, and when asked to rank them in terms of *how* funny they were, the genders again agreed. In addition, men and women had very little difference in their response times to the jokes they liked.

Given the sexes' similar capacity for humor production and appreciation, the fact that women laugh more—and men are laughed at more—must have its roots in something other than simply who is being funny. In fact, Provine's data support this idea, too: 80 to 90 percent of the statements that elicited laughter in his field studies were not funny at all. Rather people laughed at banal phrases such as "I'll see you guys later!" or "I think I'm done." His research also showed that people tend to laugh more when they are speaking as opposed to listening. Many studies have confirmed this finding, and experts believe that when a speaker laughs, it sets his or her audience at ease and facilitates social connections.

Provine found one notable exception to the rule that speakers laugh more than their audience, however: when a man is talking to a woman, the woman laughs more than the man. The difference is sizable: when Provine averaged laughter in two-person pairs, the speakers laughed 46 percent more than the person listening. When a woman was talking to another woman, she laughed 73 percent more than her interlocutor, but when a woman was in conversation with a man she produced 126 percent more laughter. Male speakers laughed less than female speakers, but they still laughed 25 percent more than their listeners when they were talking to

other men. But in the specific circumstance where a man was talking to a woman, the men laughed 8 percent *less* than their partners.

The fact that women laugh so much when they are speaking to men—and they laugh more than men even when the men are doing the talking—suggests that there is some instinct at play. Perhaps it is a reflection of the female role as sexual selector, but whatever the roots may be of the female instinct to laugh around men, it works—men find women attractive when they laugh. Perhaps it is because laughter unconsciously signals interest and enjoyment.

Consider that chimpanzees utter laughlike sounds when they are being chased by other chimps, and as with human children, the one being chased is the one who laughs. For chimps playing, the panting laugh is a signal to the chaser that the play is fun and nonthreatening. The enjoyment might come from anticipation, as if the laughter is sending a message: I'm going to keep running, but it's going to be *really* fun when I get caught. Because women are the ones typically chased in courtship, could there be a link? "I think there's an interesting parallel there," humor expert Martin says. "In both cases, the laughter is a signal of enjoyment and invitation to continue."

Indeed, studies have shown that laughter is a powerful measurement of the level of attraction between two people. In 1990 psychologists Karl Grammer and Irenaus Eibl-Eibesfeldt of the Ludwig Boltzmann Institute for Urban Ethology in Vienna studied natural conversations in mixed-sex groups and measured the amount of laughter coming from men and women. Later on each individual self-reported how attracted they were to other members of the group. It turns out it is the amount of female laughter that accurately predicts the level of attraction between *both* partners. In other words, a woman laughs a lot when she is attracted to a man or when she senses a man's interest—and that laughter, in turn, might make her more attractive to him or signal that she welcomes his attention.

Funny through the Years

As attraction transitions to a relationship, humor's role changes, but sharing a laugh is no less important. Many agree it is the connection that humor fosters that makes it so good for relationships, especially over the

long term. Humor often becomes a private language between two people. A couple's in joke can make a mundane or tense moment hilarious.

But here again, each gender's role is different—and interestingly, in some ways men and women change places. Unlike during courtship, when men are usually the humor producers and women are the appreciators, in long-term relationships it can sometimes be harmful for men to use humor. When women are the humorous partners, however, relationships tend to thrive.

Funny men are not necessarily a curse, of course, but in certain situations male humor might be dangerous. In 1997 psychologists Catherine Cohan of Pennsylvania State University and Thomas Bradbury of the University of California, Los Angeles, analyzed the marriages of 60 couples over an 18-month period, using data from self-reports and audiotaped conversations of the couples working through a specific marital issue. They found that in couples who had a major life stressor such as a death in the family or a lost job, the husband's use of humor during problem solving was a warning sign. These couples were more likely to wind up divorced or separated within 18 months than couples with a life stressor where the male did not use humor. This result may be about men knowing how and when to crack the tension with a joke. Timing is key. "Particularly with men's humor we see it used to avoid problems or serious conversations," Martin says. "And if it's used aggressively—in a teasing or putdown way—or at an inappropriate time, it can be detrimental to the relationship."

The idea that male humor might sometimes be bad for a relationship is supported by results from the Coping Humor Scale (CHS) test developed by Martin and psychologist Herbert Lefcourt of the University of Waterloo, which measures how much one uses humor to cope with life stress. They found in 1986 that men who score high on the CHS report less marital satisfaction than their peers who do not use humor as much to cope. They also discovered that men tend to use more disparaging forms of humor, directed at others, when coping with a tough situation. If this is the type of humor men are referring to when they take the CHS, Lefcourt notes, it might explain the lower relationship satisfaction.

Women, on the other hand, have been shown by many studies to often use self-deprecating humor, which may bring relief to a tense situation. And the CHS study found that women who use more humor to cope reported greater marital satisfaction.

A recent physiological study may help explain why. Couples psychologist John Gottman of the Gottman Institute analyzed 130 couples discussing their top three most problematic issues. Starting when they were newlyweds, couples came to Gottman's lab once a year for six years and had private discussions while Gottman measured their physiological responses, such as blood pressure and pulse, with a polygraph and electrocardiogram.

Gottman found that the reduction of the male's heart rate during these intense discussions was critical for a successful marriage (whereas the women's heart rates made no difference). Some men were good at soothing themselves, but the next best way to lower these husbands' heart rates was for their wives to crack a joke to relieve the tension. Couples in which the women deescalated the conflict in this way, according to Gottman, were more likely to have a stable marriage through at least the study's six years, as compared with couples in which the wives did not use humor.

As a relationship progresses, then, a man's humor becomes less important—perhaps even counterproductive in certain situations—whereas a woman's sense of humor becomes a blessing. During courtship, a man's wit attracts a woman, and her appreciative laughter, in turn, is attractive to him. But as commitment increases, the challenge becomes less about landing a mate and more about keeping one around. "Here it is more about sympathy and attunement to the other's feelings and perspectives," Martin says. "The goal is less to entertain and impress and more to reduce interpersonal tensions, convey understanding, save face for oneself and one's partner. Women may be more skilled at these uses of humor."

Of course, in real life men and women inhabit a wide spectrum, with far greater individual variation than is reflected in the trends that show up in the lab. Many people have traits that are the opposite of those normally associated with their sex. But in general, the way men and women use

humor betrays its deeper purpose—to help us connect and bond with one another. A genuine laugh is one of the most honest ways to convey: I'm with you.

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How Science Can Help You Fall in Love

by Robert Epstein

The best way to get students interested in scientific studies is to give them hands-on experiences that get them excited about the subject matter. In chemistry courses, teachers accomplish that with test tubes and mysterious liquids. In a course I taught at the University of California, San Diego, on relationship science, I piqued my students' interest with exercises on, well, *love*.

To begin, I invited eight students who did not know each other to come to the front of the auditorium, where I paired them up randomly. I then asked each individual to rate, on a scale of 1 to 10, how much he or she liked, loved, or felt close to his or her partner. Then I asked the couples to look deeply into each other's eyes in an exercise I call Soul Gazing.

There was some giggling at first and then some very intense gazing. After two minutes, I again asked for the numbers. The result? A modest 7 percent increase in loving (meaning 1 point added for one person in one couple), an 11 percent increase in liking, and a whopping 45 percent increase in closeness. There were gasps and cheers in the audience. When I asked everyone in the class to pair up for two minutes of gazing, 89 percent of the students said the exercise increased feelings of intimacy.

And that was just the beginning....

Eye Contact

About 50 percent of first marriages fail in the U.S., as do two thirds of second marriages and three quarters of third marriages. So much for practice! We fail in large part because we enter into relationships with poor skills for maintaining them and highly unrealistic expectations. We

also tend to pick unsuitable partners, mistakenly believing that we are in love simply because we feel physical attraction.

That combination of factors sets us up for failure: eventually—often within a mere 18 months—the fog of passion dissipates, and we begin to see our partner with new clarity. All too often we react by saying, “Who are *you*?” or “You’ve *changed*.” We might try hard for years after that to keep things going, especially if children are in the picture. But if we start out with the wrong person and lack basic tools for resolving conflicts and communicating, the chances that we will succeed are slim to none.

Over the years, having looked carefully at the fast-growing scientific literature on relationship science and having conducted some new research of my own, I have come to believe that there is a definite fix for our poor performance in romantic relationships. The fix is to extract a practical technology from the research and then to teach people how to use it.

At least 80 scientific studies help to reveal how people learn to love each other. A 1989 study by psychologist James D. Laird of Clark University and his colleagues inspired my Soul Gazing exercise. The researchers showed that mutual eye gazing (but not gazing at hands) produced rapid increases in feelings of both liking and loving in total strangers. Mutual gazing is like staring, but with an important difference: for many mammalian species, staring is both intended and received as a threat. Try it on a New York subway if you have any doubts about its efficacy. In mutual gazing, however, people are giving each other *permission* to stare; that is, they are being *vulnerable* to each other, and that is the key element in emotional bonding. The vulnerability created when people are in war zones can create powerful emotional bonds in seconds, and even hostages sometimes develop strong attachments to their captors, a phenomenon called the Stockholm syndrome.

Signs of vulnerability in an animal or another person bring out tendencies in many people to provide care and protection—to be drawn to that being and to like or even love him or her. And as research in social psychology has shown for decades, when a person is feeling vulnerable and thus agitated or otherwise aroused, he or she often looks around for clues about how to interpret and label those feelings. The body is saying,

“I’m aroused, but I’m not sure why,” and the environment is suggesting an answer, namely, that you’re in love.

Love-Building Exercises

Here are some fun exercises, all inspired by scientific studies, that you can use to deliberately create emotional intimacy with a partner—even someone you barely know:

1. Two as One. Embracing each other gently, begin to sense your partner’s breathing and gradually try to synchronize your breathing with his or hers. After a few minutes, you might feel that the two of you have merged.

2. Soul Gazing. Standing or sitting about two feet away from each other, look deeply into each other’s eyes, trying to look into the very core of your beings. Do this for about two minutes and then talk about what you saw.

3. Monkey Love. Standing or sitting fairly near each other, start moving your hands, arms and legs any way you like—but in a fashion that perfectly imitates your partner. This is fun but also challenging. You will both feel as if you are moving voluntarily, but your actions are also linked to those of your partner.

4. Falling in Love. This is a trust exercise, one of many that increase mutual feelings of vulnerability. From a standing position, simply let yourself fall backward into the arms of your partner. Then trade places. Repeat several times and then talk about your feelings. Strangers who do this exercise sometimes feel connected to each other for years.

5. Secret Swap. Write down a deep secret and have your partner do the same. Then trade papers and talk about what you read. You can continue this process until you have run out of secrets. Better yet, save some of your secrets for another day.

6. Mind-Reading Game. Write down a thought that you want to convey to your partner. Then spend a few minutes wordlessly trying to broadcast that thought to him or her, as he or she tries to guess what it is. If he or she cannot guess, reveal what you were thinking. Then switch roles.

7. Let Me Inside. Stand about four feet away from each other and focus on each other. Every 10 seconds or so move a bit closer until, after several shifts, you are well inside each other’s personal space (the boundary is about 18 inches). Get as close as you can without touching. (My students tell me this exercise often ends with kissing.)

8. Love Aura. Place the palm of your hand as close as possible to your partner’s palm without actually touching. Do this for several minutes, during which you will feel not only heat but also, sometimes, eerie kinds of sparks.

Credit: Robert Epstein

A Technology of Affection

Soul Gazing is one of dozens of exercises I have distilled from scientific studies that make people feel vulnerable and increase intimacy. Love Aura, Let Me Inside and Secret Swap are other examples of fun, bond-building activities that any couple can learn and practice.

Students could earn extra credit in my course by trying out such techniques with friends, romantic interests or even total strangers. More than 90 percent of the students in the course reported using these methods successfully to improve their relationships, and more than 50 of the 213 students submitted detailed reports about their experiences. Nearly all the reports documented increases in liking, loving, closeness or attraction of between 3 and 30 percent over about a month. In a few cases, ratings tripled. (Students did not need to enhance their relationships to receive extra credit; all they had to do was document their use of the techniques.)

The few exceptions I saw made sense. One heterosexual male saw no positive effects when he tried the exercises with another male; moreover, the experience made him “uncomfortable.” When he tried them with a female, however, his intimacy ratings increased by 25 percent—and *hers* increased by 144 percent!

A student named Olivia attempted the exercises with her brother, mother, a good friend and a relative stranger. Soul Gazing failed with her brother because he could not stop giggling. When she and her mom tried the Secret Swap—an activity that creates vulnerability when people disclose secrets to each other—intimacy ratings increased by 31 percent. Exercises she tried with her friend boosted ratings between 10 and 19 percent, but most impressive was the outcome of gazing with someone she barely knew: a 70 percent increase in intimacy.

One student did the assignment with her husband of five years. The couple, Asa and Gill, tried out eight different exercises, and even though their “before” scores were usually very high (9s and 10s), every exercise they tried increased their scores by at least 3 percent. Overall, Asa wrote, “I noticed a drastic change in our bond for one another. My husband seems more affectionate now than he was, for which I am really grateful.” She also reported a bonus: a substantial drop in the frequency with which she and her spouse called attention to their past mistakes. This change probably came about because the couple was now, as a result of my course, broadly interested in enhancing their relationship.

Taking Control

The students in my course were doing something new—taking *control* over their love lives. We grow up on fairy tales and movies in which magical forces help people find their soul mates, with whom they effortlessly live happily ever after. The fairy tales leave us powerless, putting our love lives into the hands of the Fates.

But here is a surprise: most of the world has never heard of those fairy tales. Instead more than half of marriages on our globe are brokered by parents or professional matchmakers, whose main concerns are long-term suitability and family harmony. In India an estimated 95 percent of the marriages are arranged, and although divorce is legal, India has one of the lowest divorce rates in the world. (This is starting to change, of course, as Western ways encroach on traditional society.)

Young couples in India generally have a choice about whether to proceed, and the combination of choice and sound guidance probably accounts for the fact that studies of arranged marriages in India indicate that they measure up well—in, for example, longevity, satisfaction and love—against Western marriages. Indeed, the love experienced by Indian couples in arranged marriages appears to be even more robust than the love people experience in “love marriages.” In a 1982 study psychologists Usha Gupta and Pushpa Singh of the University of Rajasthan in Jaipur, India, used the Rubin Love Scale, which gauges intense, romantic, Western-style love, to determine that love in love marriages in India does exactly what it does in love marriages here: it starts high and declines fairly rapidly. But love in the arranged marriages they examined started out low and gradually *increased*, surpassing the love in the love marriage about five years out. Ten years into the marriage the love was nearly twice as strong.

How do they do it? How do people in some arranged marriages build love deliberately over time—and can we do it, too?

Over the past few years I have been interviewing people in arranged marriages in which love has grown over time. One of these couples is Kaiser and Shelly Haque of Minneapolis, who have been happily married for years and have two bright, welladjusted children. Once he had a secure life in the U.S., Kaiser, an immigrant from Bangladesh, returned to his native country to let his family know he was ready for matrimony. The

family did the rest. After just one meeting with Shelly—where, Kaiser said, there was “like at first sight”—the arrangements were made. “We’ve grown to love each other and to get to know each other over time,” Kaiser says. “The sparks are getting bigger, and I think we can do even better in the future.”

Kaiser and Shelly are not atypical. A study that Mansi Thakar, a student at the University of Southern California, and I presented at the November 2009 meeting of the National Council on Family Relations included 30 individuals from nine countries of origin and five different religions. Their love had grown, on average, from 3.9 to 8.5 on a 10-point scale in marriages lasting an average of 19.4 years.

These individuals identified 11 factors that contributed to the growth of their love, 10 of which dovetailed beautifully with the scientific research I reviewed in my course. The most important factor was commitment, followed by good communication skills. The couples also identified sharing secrets with a spouse, as well as accommodation—that is, the voluntary altering of a partner’s behavior to meet the other person’s needs. Seeing a spouse in a vulnerable state (caused by injury or illness) was also singled out. There are many possible lessons here for Westerners, among them: do things deliberately that make you vulnerable to each other. Try experiencing danger, or thrilling simulations of it, as a couple.

The results conflicted with those of American studies in only one respect: several of the subjects said their love grew when they had children with their spouse. Studies in the U.S. routinely find parenting to be a threat to feelings of spousal love, but perhaps that tendency results from the strong feelings and unrealistic expectations that launch our relationships. The stress of raising children tends to disrupt those expectations and ultimately our positive feelings for each other.

Studies in Intimacy

Dozens of scientific studies illuminate how people fall in love—and hint at techniques for building strong relationships. Here are 10 kinds of investigations that are helping to inspire a new technology of love.

1. Arousal. Studies by researchers such as psychologist Arthur Aron of Stony Brook University show that people tend to bond emotionally when aroused, say, through exercise, adventures or exposure to dangerous situations. Roller coaster, anyone? (See the Falling in Love exercise, above.)

2. Proximity and familiarity. Studies by Stanford University social psychologists Leon Festinger and Robert Zajonc and others conclude that simply being around someone tends to produce positive feelings. When two people consciously and deliberately allow each other to invade their personal space, feelings of intimacy can grow quickly. (See the Let Me Inside exercise, above.)

3. Similarity. Opposites sometimes attract, but research by behavioral economist Dan Ariely of Duke University and the Massachusetts Institute of Technology and others shows that people usually tend to pair off with those who are similar to themselves—in intelligence, background and level of attractiveness. Some research even suggests that merely imitating someone can increase closeness. (See the Monkey Love exercise, above.)

4. Humor. Marriage counselors and researchers Jeanette and Robert Lauer showed in 1986 that in long-term, happy relationships, partners make each other laugh a lot. Other research reveals that women often seek male partners who can make them laugh—possibly because when we are laughing, we feel vulnerable. Know any good jokes?

5. Novelty. Psychologist Greg Strong of Florida State University, Aron and others have shown that people tend to grow closer when they are doing something new. Novelty heightens the senses and also makes people feel vulnerable.

6. Inhibitions. Countless millions of relationships have probably started with a glass of wine. Inhibitions block feelings of vulnerability, so lowering inhibitions can indeed help people bond. Getting drunk, however, is blinding and debilitating. (Instead of alcohol, try the Two as One exercise, above.)

7. Kindness, accommodation and forgiveness. A variety of studies confirm that we tend to bond to people who are kind, sensitive and thoughtful. Feelings of love can emerge especially quickly when someone deliberately changes his or her behavior—say, by giving up smoking or drinking—to accommodate our needs. Forgiveness often causes mutual bonding, because when one forgives, one shows vulnerability.

8. Touch and sexuality. The simplest touch can produce warm, positive feelings, and a backrub can work wonders. Even getting very near someone without actually touching can have an effect. Studies by social psychologist Susan Sprecher of Illinois State University, among others, also show that sexuality can make people feel closer emotionally, especially for women. There is danger here, however: confusing sexual attraction with feelings of love. You cannot love someone without knowing him or her, and attraction blinds people to important characteristics of their partner.

9. Self-disclosure. Research by Aron, Sprecher and others indicates that people tend to bond when they share secrets with each other. Once again, the key here is allowing oneself to be vulnerable. (See the Secret Swap exercise, above.)

10. Commitment. We are not that good at honoring our relationship commitments in the U.S., but studies by researchers such as psychologist Ximena Arriaga of Purdue University suggest that commitment is an essential element in building love. People whose commitments are shaky interpret their partners' behavior more negatively, for one thing, and that can be deadly over time. Covenant marriage—currently a legal option only in Arizona, Arkansas and Louisiana—is a new kind of marriage (emerging from the evangelical Christian movement) involving a very strong commitment: couples agree to premarital counseling and limited grounds for divorce. Conventional marriage in America can be abandoned easily, even without specific legal cause (the so-called no-fault divorce).

Creating Love

A careful look at arranged marriage, combined with the knowledge accumulating in relationship science, has the potential to give us real control over our love lives—without practicing arranged marriage. Americans want it all—the freedom to choose a partner and the deep, lasting love of fantasies and fairy tales. We can achieve that kind of love by learning about and practicing techniques that build love over time. And when our love is fading, we can use such techniques to rebuild that love. The alternative—leaving it to chance—makes little sense.

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(January/February 2010)

The Happy Couple

by Suzann Pileggi Pawelski

Lisa, an elementary school teacher from Ambler, Pa., came home from work one day and said to her husband, "Honey, guess what? I landed that summer teaching position I wanted!" "Wow, congratulations!" he replied. "I know how hard you worked to get that job. I am so happy for you! You must be really excited." The way Lisa's husband reacted to her good news was also good news for their marriage, which, years later, is still going strong; such positive responses turn out to be vital to the longevity of a relationship.

Numerous studies show that intimate relationships, such as marriages, are the single most important source of life satisfaction. Although most couples enter these relationships with the best of intentions, many break up or stay together but languish. Yet some do stay happily married and thrive. What is their secret?

A few clues emerge from the latest research in the nascent field of positive psychology. Founded in 1998 by psychologist Martin E. P. Seligman of the University of Pennsylvania, this discipline includes research into positive emotions, human strengths and what is meaningful in life. In the past few years positive psychology researchers have discovered that thriving couples accentuate the positive in life more than those who stay together unhappily or split do. They not only cope well during hardship but also celebrate the happy moments and work to build more bright points into their lives.

It turns out that how couples handle good news may matter even more to their relationship than their ability to support each other under difficult circumstances. Happy pairs also individually experience a higher ratio of upbeat emotions to negative ones than people in unsuccessful liaisons do.

Certain tactics can boost this ratio and thus help to strengthen connections with others. Another ingredient for relationship success: cultivating passion. Learning to become devoted to your significant other in a healthy way can lead to a more satisfying union.

Let the Good Times Roll

Until recently, studies largely centered on how romantic partners respond to each other's misfortunes and on how couples manage negative emotions such as jealousy and anger—an approach in line with psychology's traditional focus on alleviating deficits. One key to successful bonds, the studies indicated, is believing that your partner will be there for you when things go wrong. Then, in 2004, psychologist Shelly L. Gable, currently at the University of California, Santa Barbara, and her colleagues found that romantic couples share positive events with each other surprisingly often, leading the scientists to surmise that a partner's behavior also matters when things are going well.

In a study published in 2006 Gable and her coworkers videotaped dating men and women in the laboratory while the subjects took turns discussing a positive and negative event. After each conversation, members of each pair rated how "responded to"—how understood, validated and cared for—they felt by their partner. Meanwhile observers rated the responses on how active-constructive (engaged and supportive) they were—as indicated by intense listening, positive comments and questions, and the like. Low ratings reflected a more passive, generic response such as "That's nice, honey." Separately, the couples evaluated their commitment to and satisfaction with the relationship.

The researchers found that when a partner proffered a supportive response to cheerful statements, the "responded to" ratings were higher than they were after a sympathetic response to negative news, suggesting that how partners reply to good news may be a stronger determinant of relationship health than their reaction to unfortunate incidents. The reason for this finding, Gable surmises, may be that fixing a problem or dealing with a disappointment—though important for a relationship—may not make a couple feel joy, the currency of a happy pairing.

In addition, couples who answered good news in an active-constructive way scored higher on almost every type of measure of relationship satisfaction than those who responded in a passive or destructive way. (Passive replies indicate a lack of interest, as in changing the subject, and destructive responses include negative statements such as “That sounds like tons of work!”) Surprisingly, a passive-constructive response (“That’s nice, honey”) was almost as damaging as directly disparaging a partner’s good news. These data are consistent with an earlier study showing that active-constructive responders experience fewer conflicts and engage in more fun activities together. These individuals also are more likely to remain together. Active-constructive responding shows that a person cares about why the good news is important, Gable says, conveying that you “get” your partner. Conversely, negative or passive reactions signify that the responder is not terribly interested—in either the news or the person disclosing it.

Thankfully, life affords many opportunities to respond supportively to optimistic announcements: Gable, along with social psychologist Jonathan Haidt of the University of Virginia, reported in 2005 that, for most individuals, positive events happen at least three times as often as negative ones. And just as responding enthusiastically to your partner’s good news increases relationship satisfaction so does sharing your own positive experiences. In a daily diary study of 67 cohabiting couples published in *Advances in Experimental Social Psychology* in 2010, Gable found that on days when couples reported telling their partner about a happy event they also reported feeling a stronger tie to their partner and greater security in their match.

Power of Positive Emotions

One of the benefits of reveling in the good times is a boost in the positive emotions of both members of a couple. Over a decade ago positive psychology pioneer Barbara L. Fredrickson of the University of North Carolina at Chapel Hill showed that positive emotions, even “eeting ones, can broaden our thinking and enable us to connect more closely with others. Having an upbeat outlook, she argues, enables people to see the big picture and avoid getting hung up on small annoyances. This wide-angle view often brings to light new possibilities and offers solutions to difficult

problems, making individuals better at handling adversity in relationships and other parts of life. It also tends to dismantle boundaries between “me” and “you,” creating stronger emotional attachments. “As positivity broadens your mind, it shifts your core view of people and relationships, bringing them closer to your center, to your heart,” Fredrickson says.

When a person’s positive sentiments outnumber negative feelings by three to one, that individual reaches a tipping point beyond which he or she becomes more resilient in life and love, Fredrickson found. Among individuals in enduring and mutually satisfying marriages, ratios tend to be even higher, hovering around five to one, according to research by world-renowned marriage expert John Gottman, emeritus professor of psychology at the University of Washington.

In her book *Positivity* (Crown, 2009), Fredrickson lists the 10 most frequent positive emotions: joy, gratitude, serenity, interest, hope, pride, amusement, inspiration, awe and love. Although all these emotions matter, gratitude may be one of the most important for relationships, she says. Expressing gratitude on a regular basis can help you appreciate your partner rather than taking his or her small favors or kind acts for granted, and that boost in appreciation strengthens your relationship over time. In a study published in *Personal Relationships* in 2010, social psychology researcher Sara B. Algoe, also at Chapel Hill, and her colleagues asked cohabiting couples, 36 percent of whom were married or engaged, to report nightly for two weeks how grateful they felt toward their partners from their interactions that day. In addition to gratitude, they numerically rated their relationship satisfaction and their feelings of connection with their partner. On days that people felt more gratitude toward their partner, they felt better about their relationship and more connected to him or her; they also experienced greater relationship satisfaction the *following* day. Additionally, their partners (the recipients of the gratitude) were more satisfied with the relationship and more connected to them on that same day. Thus, moments of gratitude may act as a booster shot for romantic relationships.

The fact that gratitude affected both partners also hints that *expressing* your gratitude is important for relationship satisfaction. To test this idea directly, Algoe, Fredrickson and their colleagues asked people in romantic

relationships to list nice things their partners had done for them lately and to rate on a scale from 1 (not at all) to 7 (very much) how well they thought they had expressed appreciation to their partner for having done those favors. In results not yet published, the researchers found that each unit improvement in expressed appreciation decreased by half the odds of the couple breaking up in six months.

How Positive Are You?

Although all healthy relationships involve some negative feelings, positive emotions form the foundation of any strong pairing. Psychologist Barbara L. Fredrickson of the University of North Carolina at Chapel Hill found that individuals who thrive in and outside relationships experience a ratio of three or more positive emotions for every negative one in their daily lives. To find out if you meet or exceed this three-to-one standard, take the following quiz, called the Positivity Self Test, developed by Fredrickson in 2009.

Instructions

Using the scale below, indicate the greatest degree to which you have experienced each of the following emotions during the previous 24 hours.

0 = Not at all

1 = A little bit

2 = Moderately

3 = Quite a bit

4 = Extremely

- 1. What is the most amused, fun-loving or silly you felt?
- 2. What is the most angry, irritated or annoyed you felt?
- 3. What is the most ashamed, humiliated or disgraced you felt?
- 4. What is the most awe, wonder or amazement you felt?
- 5. What is the most contemptuous, scornful or disdainful you felt?
- 6. What is the most disgust, distaste or revulsion you felt?
- 7. What is the most embarrassed, self-conscious or blushing you felt?
- 8. What is the most grateful, appreciative or thankful you felt?
- 9. What is the most guilty, repentant or blameworthy you felt?
- 10. What is the most hate, distrust or suspicion you felt?
- 11. What is the most hopeful, optimistic or encouraged you felt?
- 12. What is the most inspired, uplifted or elevated you felt?
- 13. What is the most interested, alert or curious you felt?
- 14. What is the most joyful, glad or happy you felt?
- 15. What is the most love, closeness or trust you felt?
- 16. What is the most proud, confident or self-assured you felt?
- 17. What is the most sad, downhearted or unhappy you felt?
- 18. What is the most scared, fearful or afraid you felt?
- 19. What is the most serene, content or peaceful you felt?

___ 20. What is the most stressed, nervous or overwhelmed you felt?

Scoring

Circle questions 1, 4, 8, 11, 12, 13, 14, 15, 16 and 19 and then underline questions 2, 3, 5, 6, 7, 9, 10, 17, 18 and 20. Count the number of circled (positivity) questions you rated 2 or higher and the number of underlined (negativity) questions you scored 1 or higher. Divide your positivity tally by your negativity tally. (If your negativity tally is zero, replace it with a 1.) The result represents your positivity ratio for today.

If you scored below 3:1, as more than 80 percent of Americans do, you may be able to raise that ratio with exercises recommended in this article and in Fredrickson's book, *Positivity* (Crown, 2009). Because this test provides a mere snapshot of your feelings during the previous 24 hours, you may also want to repeat it nightly for two weeks to gain a more reliable assessment of your positivity ratio. (For a convenient way to test yourself, and for more details, visit www.positivityratio.com.)

Credit: Barbara L. Fredrickson

Promoting Passion

Like gratitude, feelings of passion can strengthen our bonds with others. Many people equate passion with a desperate longing, suggested by song lyrics such as "I can't live without you" and "I can't concentrate when you're not around." But such unbridled or obsessive passion is not conducive to a healthy relationship, according to work by social psychologist Robert Vallerand of the University of Quebec at Montreal. On the contrary, obsessive passion—a type that seems to control you—is as detrimental to the relationship, making it less satisfying sexually and otherwise, as having no passion.

A healthy passion—a voluntary inclination toward an activity or person that we love and value—does provide benefits, however. In recent studies using the Romantic Passion Scale, a questionnaire that measures harmonious and obsessive passion, Vallerand found that harmonious passion helps couples relate better, in part, by enabling them to become intimate with their partner while maintaining their own identity, which helps to foster a more mature partnership. Their intimacy enables them to continue to pursue their own hobbies and interests rather than subjugating their own sense of self to an excessive attachment to the other person. (Previous research by Vallerand and his colleagues revealed that harmonious passion for activities leads to cognitive and emotional advantages, such as better concentration, a more positive outlook and better mental health. No one has yet studied whether these benefits spill over to our romantic relationships, however.)

You can cultivate healthy passion by joining your partner in a pursuit that both of you enjoy, Vallerand suggests. Engaging in exhilarating activities with another person has been shown to boost mutual attraction. Avoid serious competition because the point of the outing should not be winning but enjoying time together. Another tip: write down and share with your partner some of the reasons why you love him or her and why your relationship is important.

Positive Steps

Experts also have tips for injecting positive emotions into your life. First, learn to respond constructively to your partner's positive declarations. Look for opportunities to express your interest, support and enthusiasm. Acknowledge a terrific presentation at work, say, or faster time in a road race. Ask yourself regularly: "What good news has my partner told me today? How can we celebrate it?" Affirm your partner's joy first. Discuss your concerns, such as the practical downsides of a promotion, at a later time. In addition, be attentive and actively participate in the conversation. Ask questions and indicate interest nonverbally: maintain eye contact, lean forward and nod. To show you heard, rephrase a part of what he or she said, for instance: "You seem really excited about this new job."

Moreover, a variety of exercises can boost your ratio of positive to negative emotions. Schedule exuberant feelings into your day by, say, making time for activities that evoke such emotions. Locate places you can walk to quickly to connect with nature or other beautiful scenery. Make these places regular destinations for exercising, reflecting or hanging out with friends. In addition, practice savoring a genuine source of positive emotion that is currently, has been or will be a part of your life. Truly cherish the event by focusing intently on the feelings it evokes.

Another idea for raising your personal positivity score: create a "positivity portfolio," a collection of meaningful mementos signifying a positive emotion. For example, you might encapsulate joy by creating a collage of uplifting song lyrics and pictures that make you smile. Looking at your creation every day for 20 minutes can improve your positivity score. Try infusing fun or pleasure into mundane tasks. For instance, transform dinner preparation into a family activity in which the kids help

by measuring ingredients and slicing vegetables, perhaps learning about nutrition along the way, Fredrickson says. Or play romantic or fun music during the dinner-making process. Turn daily challenges or snafus, like your child's misplaced shoes, into a game to see who can find them first.

Look for opportunities to thank your partner. "Try highlighting those small moments in which your partner has been thoughtful and expressing it to him or her," Fredrickson suggests. And find time each day to share something positive that has happened to you.

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SECTION 4

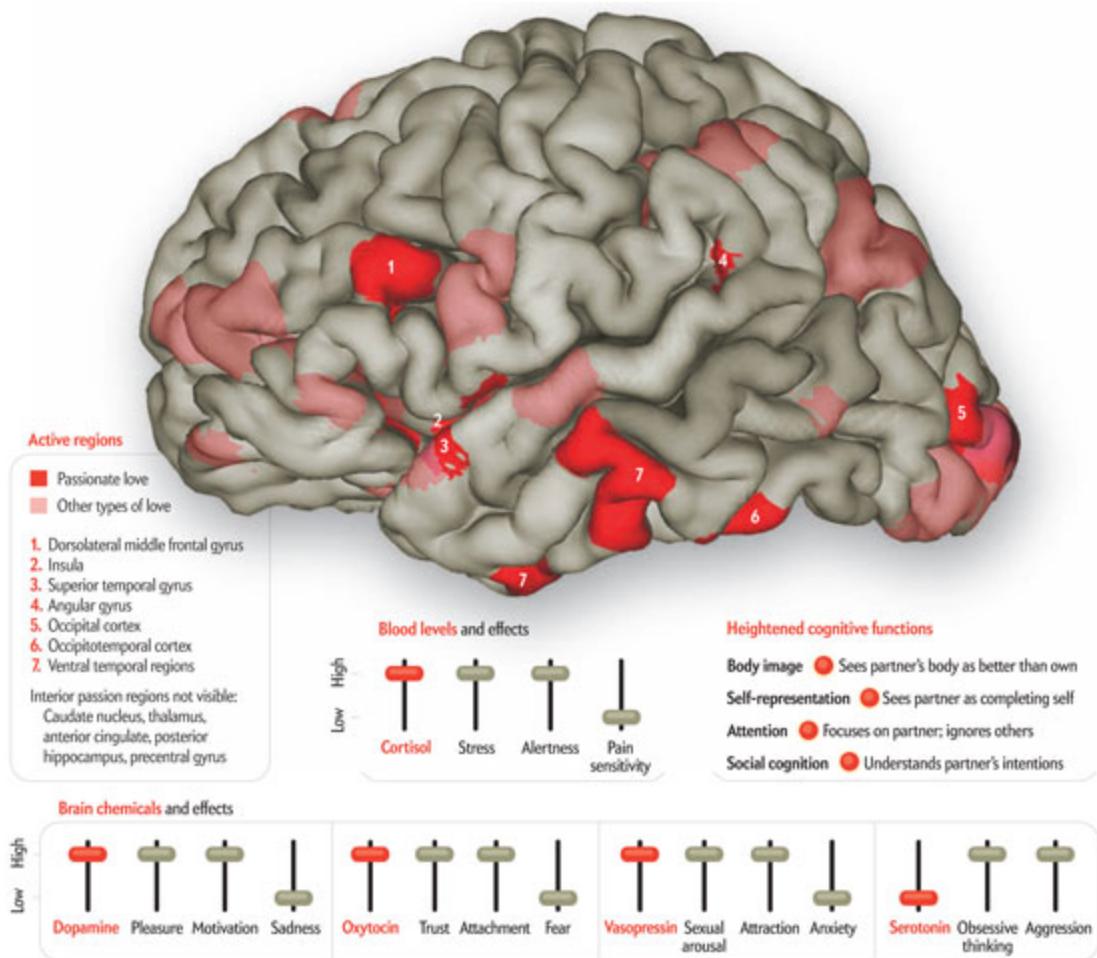
Sex and Love in the Brain

Your Brain in Love

by Mark Fischetti

Men and women can now thank a dozen brain regions for their romantic fervor. Researchers have revealed the fonts of desire by comparing functional MRI studies of people who indicated they were experiencing passionate love, maternal love or unconditional love. Together, the regions release neurotransmitters and other chemicals in the brain and blood that prompt greater euphoric sensations such as attraction and pleasure. Conversely, psychiatrists might someday help individuals who become dangerously depressed after a heartbreak by adjusting those chemicals.

Passion also heightens several cognitive functions, as the brain regions and chemicals surge. “It’s all about how that network interacts,” says Stephanie Ortigue, an assistant professor of psychology at Syracuse University, who led the study. The cognitive functions, in turn, “are triggers that fully activate the love network.” Tell that to your sweetheart on Valentine’s Day.



Credit: James W. Lewis, Jen Christiansen

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All You Need Is Love: The Neurochemical Jolt and Obsession

by Cassie Rodenberg

Love is maddening and inconvenient and exhilarating and wonderful. We often feel overwhelmed by it, heart pounding, “head over heels,” “crazy in love.” But how much is too much? And what’s the difference between feelings of normal love and desire, and love addiction? Where, exactly, is the line?

For years I’ve known a woman we’ll call Elaine. Elaine at the time was in her mid-40s, fun-loving and attractive. “Let’s do a drive-by,” she whispered. “We’ll go by Richard’s house. I want to see what he’s doing,” Richard her long-time ex-boyfriend. At this point, I slunk low in the car, envisioning an arrest or otherwise embarrassing debacle. I thought I was in the clear when Richard proved to be out for the evening. Alas, no, instead, Elaine went through Richard’s garbage. A woman, who, two hours earlier had swapped fashion tips on a routine shopping trip with me was now reduced to sifting out two bottles of wine in a trash can—to her, an obvious indication that he’s seeing someone, and a debilitating blow to her psyche.

My mind was racing—where had sense gone? Who would go to such lengths, risking further alienating the object of her affection?

And, of course, it isn’t just women. I once briefly dated a magazine executive, who, after I asked to part ways, proceeded to call my office and email me for months (even years) after the fact, begging for any sort of connection, a man who many would call the epitome of New York success with prestige, charm and influence. From where do these acts of desperation arise?

We hear stories like this again and again, taken to the extreme in stories and popularized in shows like *Stalked on Investigation Discovery*. (Disclosure: I work for a branch of Discovery.) Stalking, a frightening form of obsession, may, in some cases, be love addiction gone wild.

The “compulsive need” for a partner can be as psychologically dangerous as any drug, perhaps more so because we’re all seeking love in our lifetime, where as alcohol or vicodin could be weened from our lifestyle.

Reading anthropologist Helen Fisher’s “Why We Love,” I was staggered by just how much we actually need one another—we rise and fall with our lover’s heartstrings, exhibit emotional dependence, have moods that wane and wax with our lover’s. And who’s to say this is negative?

Fisher conducted a simple survey in the vicinity of an American university and a university in Japan (839 participants), which showcases our level of attachment to one another. Age, gender, ethnic group and responses through other key demographics remained consistent.

A snapshot of the findings:

- 73% of men and 85% of women remembered trivial things that their beloved said and did
- 79% of men and 78% of women said their mind continually drifted to their beloved when they were at school or work, and furthermore, 47% of men and 50% of women agreed that “no matter where it starts, my mind always seems to end up thinking about _____”
- 68% of men and 56% of women showed support of “My emotional state depends on how _____ feels about me”

We commit a high volume of mental real estate to whom we romantically love.

fMRI results support the notion that romantic love is a form of addictive drug (PDF), stimulating the same pathways as opioids and cocaine, the mesolimbic reward system. This, as Fisher points out, allows for tolerance, withdrawal and relapse. Sound familiar?

Like substance addicts, love addicts trying to break cycles with toxic partners need to avoid triggers, situations that stimulate their amygdala or

reptilian brain and raise their cravings to “use.” These include old meeting places, songs, and shared pastimes.

Relapses look a lot like obsession, crazed, nearly unconscious actions, described by Derek Walcott’s “The Fist”:

The fist clenched round my heart
loosens a little, and I gasp
brightness; but it tightens
again. When have I ever not loved
the pain of love? But this has moved

past love to mania. This has the strong
clench of the madman, this is
gripping the ledge of unreason, before
plunging howling into the abyss.

Hold hard then, heart. This way at least you live.

It’s understandable why even the most “normal” among us seem to lose our minds when spurned or losing in love—we’re undergoing withdrawal. We seek neurochemical hits of this drug and would live and die for a fix, like many under the pull of a drug addiction. It’s our brain chemistry’s nature.

But ultimately, we’re all looking for a long-term relapse, a stable maintenance of this neurochemical flow, attachment, as Fisher notes. The lesson here is to treat ourselves gently, to understand that this primordial drive for love and affection is present in us all, and to be kind with ourselves in recovering and feeling the need for it.

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Does Falling in Love Make Us More Creative?

by Nira Liberman and Oren Shapira

Love has inspired countless works of art, from immortal plays such as *Romeo and Juliet*, to architectural masterpieces such as the Taj Mahal, to classic pop songs, like Queen's "Love of My Life". This raises the obvious question: why is love such a stimulating emotion? Why does the act of falling in love—or at least thinking about love – lead to such a spur of creative productivity?

One possibility is that when we're in love we actually think differently. This romantic hypothesis was tested by the psychologists Jens Förster, Kai Epstude, and Amina Özelsel at the University of Amsterdam. The researchers found that love really does alter our thoughts, and that this profound emotion affects us in a way that is different than simply thinking about sex.

The clever experiments demonstrated that love makes us think differently in that it triggers global processing, which in turn promotes creative thinking and interferes with analytic thinking. Thinking about sex, however, has the opposite effect: it triggers local processing, which in turn promotes analytic thinking and interferes with creativity.

Why does love make us think more globally? The researchers suggest that romantic love induces a long-term perspective, whereas sexual desire induces a short-term perspective. This is because love typically entails wishes and goals of prolonged attachment with a person, whereas sexual desire is typically focused on engaging in sexual activities in the "here and now". Consistent with this idea, when the researchers asked people to imagine a romantic date or a casual sex encounter, they found that those who imagined dates imagined them as occurring farther into the future than those who imagined casual sex.

According to construal level theory (CLT), thinking about events that are farther into the future or past—or any kind psychological distancing (such as considering things or people that are physically farther away, or considering remote, unlikely alternatives to reality) triggers a more global processing style. In other words, psychological distancing makes us see the forest rather than the individual trees.

A global processing style promotes creative thinking because it helps raise remote and uncommon associations. Consider, for example, the act of finding a gift for your partner. If we think about a gift while in a local mindset, then we'll probably focus on more literal and concrete options, most of which involve a tangible object wrapped in colorful paper. We'll probably consider the usual suspects, such as a watch, a book, or perfume. However, thinking about a gift more globally might inspire us to consider a gift as "anything that will make him/her happy". This may, in turn, bring to mind more diverse and original ideas, such as going on a joint vacation, writing a song, or cleaning and remodeling the house. Of course, this doesn't mean we should always think globally. While local processing might interfere with creativity, it also promotes analytic thinking, which requires us to apply logical rules. For example, if you are looking for a piece of furniture in a big display according to a pre-defined list of criteria (e.g., size, color, price), a local mindset may help you find a match, by preventing you from being side-tracked by attractive but irrelevant options and by making you pay more attention to relevant details.

In sum, the authors suggest that, because love activates a long-term perspective that elicits global processing, it should also promote creativity and impede analytic thinking. In contrast, inasmuch as sex activates a short-term perspective that elicits local processing, it should also promote analytic thinking and impede creative thinking.

The authors present two studies to support this model. Participants in the first study first imagined one of three situations: a long walk with their beloved one (the love condition), casual sex with a person to whom they were attracted but not in love with (the sex condition), or a nice walk on their own (the control condition). Participants then attempted to solve three creative insight problems and four problems that assess analytic thinking, which were logic problems from the Graduate Record

Examination (GRE) (e.g., if $A < B$ and $C > B$ then ?) As predicted, participants in the love condition solved more creativity problems and less analytic problems than those in the control condition. Participants in the sex condition, on the other hand, solved less creativity problems and more analytic problems compared to participants in the control condition.

The second study examined whether more subtle reminders of love and sex can also elicit similar effects. First, as part of an alleged attention task, participants were subliminally presented with words related to love (e.g. "loving"), words related to sex (e.g., "eroticism"), or a non-word letter string (control condition; "XQFBZ"). Next, analytic thinking was measured using the same GRE problems as in the first study. Creative thinking was measured this time using a generation task, in which participants had limited time to generate as many uses for a brick as possible. Replicating the findings of the first study, participants in the love condition generated more creative uses and solved less analytic problems than those in the control condition, whereas participants in the sex condition displayed the opposite pattern.

One of the most noteworthy implications of these experiments is that love and sex don't simply influence the way we think about the people we love or desire. Instead, they influence the way we think about everything. The same researchers demonstrate this tendency in yet another experiment. When in love, it seems, we struggle to distinguish between the different qualities of the beloved person (e.g., "If he is so handsome, he must also be kind!"), a phenomenon that is often labeled the halo effect. Does love also promote halo effects for other objects? It seems that the answer is yes. The same group of researchers reasoned that the halo effect reflects global processing, and therefore it should increase when people think of love and decrease when they think of sex. They found the predicted pattern of evaluations (that is, less differentiation between distinct qualities after thinking about love and more differentiation after thinking about sex), not only in evaluations of a romantic partner, but also in evaluating different aspects of a chair! The takeaway lesson is that thinking about love, or anything that promotes a distal perspective or global processing, can make us more creative. Perhaps love is an especially potent way to induce in us a sense of transcendence—being in

the here and now yet also contemplating the distant future and maybe even eternity.

--Originally published: Scientific American online, September 29, 2009.

Your Love is My Drug: Passion as Painkiller

by Katherine Harmon

Who says love hurts? New research shows that strong romantic feelings actually ease physical pain via the same neural pathways as powerful drugs.

By simply gazing at a picture of their beloved, undergraduates in a recent study were able to substantially reduce their experience of pain. The effect occurs thanks to a boost in the reward centers in the brain, according to the results, published in *PLoS ONE*.

"The areas of the brain activated by intense love are the same areas that drugs use to reduce pain," Arthur Aron, a professor of psychology at the State University of New York at Stony Brook and coauthor of the new study, said in a prepared statement. "There is intense activation in the reward area of the brain—the same area that lights up when you take cocaine, the same area that lights up when you win a lot of money." Although previous studies have shown that loving feelings can mitigate feelings of pain, this was the first to look at the brain areas at work during the process.

To ensure peak passion, the researchers recruited people who were in the first nine months of a new relationship. "We wanted subjects who were feeling euphoric, energetic" about their new partner, Sean Mackey, an associate professor of anesthesia at Stanford University School of Medicine and coauthor on the new study, said in a prepared statement.

"When passionate love is described like this, it in some ways sounds like an addiction," Mackey noted. "We thought, 'Maybe this does involve similar brain systems as those involved in addictions which are heavily

dopamine-related.'" Love, too, can get the brain blasting higher levels of the feel-good dopamine neurotransmitter.

The researchers used fMRI (functional magnetic resonance imaging) to watch the brains of 15 of these besotted students while they were either looking at pictures of their romantic partner, viewing a photo of a similarly attractive acquaintance (of the same age and gender as the partner) or completing an emotionally neutral word association task.

During each of these phases, subjects would get a warm, uncomfortably hot or painfully searing jolt on their hand and then report their experienced pain level. In between the 54 randomized segments, the subjects worked number problems in their head to minimize any amorous carryover affects. "When people are in this passionate, all-consuming phase of love, there are significant alterations in their mood that are impacting their experience of pain," Mackey noted.

Both the word-based distraction and lover's image succeeded in numbing the pain, but the fMRI revealed that they did so using very different parts of the brain. "With the distraction test, the brain pathways leading to pain relief were mostly cognitive" in the cortical areas, Jarred Younger, an assistant professor of anesthesia at Stanford and coauthor of the study, said in a prepared statement. "Loveinduced analgesia is much more associated with the reward centers" and is "activating deep structures that may block pain at the spinal level—similar to how opioid analgesics work," he noted.

So turning up the "heat" could help knock out the need for some painkillers. But with the reward centers of the brain doping these students up on love-induced, rewarding neurotransmitters, perhaps they might as well face that they could also get addicted to love.

--Originally published: Scientific American online, October 14, 2010.

Sex Is Better for Women in Love

by Melinda Wenner

Women certainly know when they experience one, but science, on the other hand, knows surprisingly little about the female orgasm. Most studies have looked at animals rather than humans, focusing on how sensory information flows to and from the sex organs. Now a new study suggests that a woman's orgasms have more to do with her brain than with her body. Not only do neural networks play a large role, but the feelings a woman has for her sexual partner are tied to just how good her orgasms are.

Researchers at Geneva University in Switzerland and the University of California, Santa Barbara, asked 29 head-over-heels heterosexual women to rate the intensity of their love as well as the quality, ease and frequency of the orgasms they achieved with their partner. Then the researchers used functional magnetic resonance imaging to map the subjects' brain activity while they focused on an unrelated cognitive task. As the subjects worked, their lovers' name flashed on screens in front of them too quickly to be noticed consciously but slowly enough to evoke a subliminal response from the brain—a technique that has been shown to reveal the neural networks involved in partner recognition and related emotions.

The more "in love" the subjects reported being, the greater activity the name flash triggered in the left angular gyrus, a brain region involved in memories of events and emotions. The most smitten subjects also reported having orgasms more easily—and far better ones, too—with ease and quality linked to activity spikes in the left insula, a region involved in reward and addiction. "The more they were satisfied by their sexual relationship in terms of orgasm, the more this brain area was activated," explains U.C.S.B. psychologist and study coauthor Stephanie Ortigue. And

this finding has implications: “Do we have to consider orgasm as another addiction?” she asks.

Ortigue points out that her study found no link between intensity of love and how often the women climaxed. After all, and quite fortunately, she says, a woman doesn’t have to be in love to have an orgasm.

--Originally published: Scientific American Mind 19(1), 9.
(February/March 2008)

Affairs of the Lips

by Chip Walter

When passion takes a grip, a kiss locks two humans together in an exchange of scents, tastes, textures, secrets and emotions. We kiss furtively, lasciviously, gently, shyly, hungrily and exuberantly. We kiss in broad daylight and in the dead of night. We give ceremonial kisses, affectionate kisses, Hollywood air kisses, kisses of death and, at least in fairytales, pecks that revive princesses.

Lips may have evolved first for food and later applied themselves to speech, but in kissing they satisfy different kinds of hungers. In the body, a kiss triggers a cascade of neural messages and chemicals that transmit tactile sensations, sexual excitement, feelings of closeness, motivation and even euphoria.

Not all the messages are internal. After all, kissing is a communal affair. The fusion of two bodies dispatches communiqués to your partner as powerful as the data you stream to yourself. Kisses can convey important information about the status and future of a relationship. So much, in fact, that, according to recent research, if a first kiss goes bad, it can stop an otherwise promising relationship dead in its tracks.

Some scientists believe that the fusing of lips evolved because it facilitates mate selection. “Kissing,” said evolutionary psychologist Gordon G. Gallup of the University at Albany, State University of New York, in a 2007 interview with the BBC, “involves a very complicated exchange of information—olfactory information, tactile information and postural types of adjustments that may tap into underlying evolved and unconscious mechanisms that enable people to make determinations....about the degree to which they are genetically incompatible.” Kissing may even reveal the extent to which a partner is

willing to commit to raising children, a central issue in long-term relationships and crucial to the survival of our species.

Satisfying Hunger

Whatever else is going on when we kiss, our evolutionary history is embedded within this tender, tempestuous act. In the 1960s British zoologist and author Desmond Morris first proposed that kissing might have evolved from the practice in which primate mothers chewed food for their young and then fed them mouth-to-mouth, lips puckered. Chimpanzees feed in this manner, so our hominid ancestors probably did, too. Pressing outturned lips against lips may have then later developed as a way to comfort hungry children when food was scarce and, in time, to express love and affection in general. The human species might eventually have taken these proto-parental kisses down other roads until we came up with the more passionate varieties we have today.

Silent chemical messengers called pheromones could have sped the evolution of the intimate kiss. Many animals and plants use pheromones to communicate with other members of the same species. Insects, in particular, are known to emit pheromones to signal alarm, for example, the presence of a food trail, or sexual attraction.

Whether humans sense pheromones is controversial. Unlike rats and pigs, people are not known to have a specialized pheromone detector, or vomeronasal organ, between their nose and mouth. Nevertheless, biologist Sarah Woodley of Duquesne University suggests that we might be able to sense pheromones with our nose. And chemical communication could explain such curious findings as a tendency of the menstrual cycles of female dormitory mates to synchronize or the attraction of women to the scents of T-shirts worn by men whose immune systems are genetically compatible with theirs. Human pheromones could include an drostenol, a chemical component of male sweat that may boost sexual arousal in women, and female vaginal hormones called copulins that some researchers have found raise testosterone levels and increase sexual appetite in men.

If pheromones do play a role in human courtship and procreation, then kissing would be an extremely effective way to pass them from one person

to another. The behavior may have evolved because it helps humans find a suitable mate—making love, or at least attraction, quite literally blind.

We might also have inherited the intimate kiss from our primate ancestors. Bonobos, which are genetically very similar to us (although we are not their direct descendants), are a particularly passionate bunch, for example. Emory University primatologist Frans B. M. de Waal recalls a zookeeper who accepted what he thought would be a friendly kiss from one of the bonobos, until he felt the ape's tongue in his mouth!

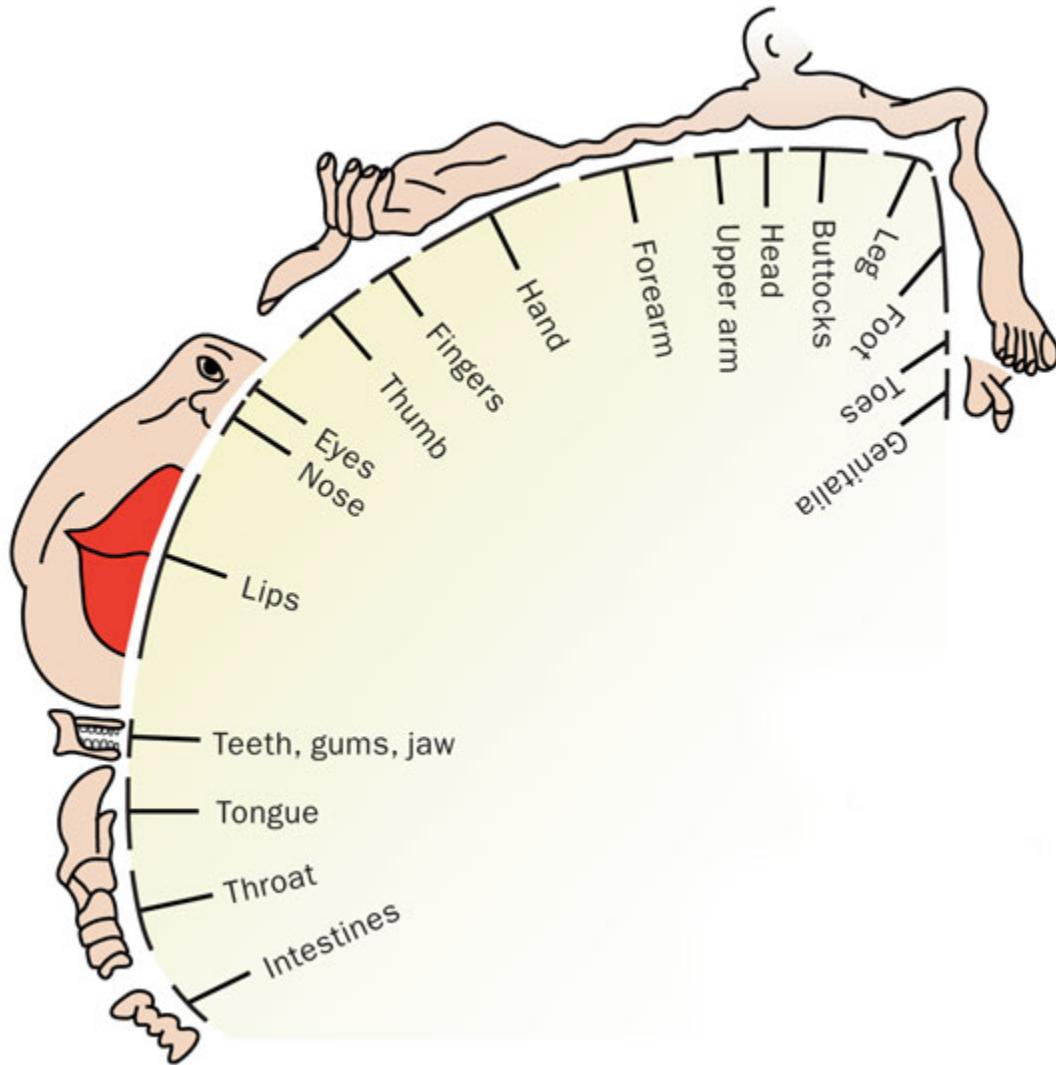
Good Chemistry

Since kissing evolved, the act seems to have become addictive. Human lips enjoy the slimmest layer of skin on the human body, and the lips are among the most densely populated with sensory neurons of any body region. When we kiss, these neurons, along with those in the tongue and mouth, rocket messages to the brain and body, setting off delightful sensations, intense emotions and physical reactions.

Of the 12 or 13 cranial nerves that affect cerebral function, five are at work when we kiss, shuttling messages from our lips, tongue, cheeks and nose to a brain that snatches information about the temperature, taste, smell and movements of the entire affair. Some of that information arrives in the somatosensory cortex, a swath of tissue on the surface of the brain that represents tactile information in a map of the body. In that map, the lips loom large because the size of each represented body region is proportional to the density of its nerve endings.

Sensory Homunculus

Tactile information from the skin arrives at the brain's primary somatosensory cortex, which contains a distorted map of the body called the sensory homunculus. In this map, the lips are disproportionately large because they are densely populated with sensory receptors and, therefore, acutely sensitive to touch.



Credit: Gehirn & Geist/Siganim; Source: Penfield and Rasmussen, 1950.

Kissing unleashes a cocktail of chemicals that govern human stress, motivation, social bonding and sexual stimulation. In a study, psychologist Wendy L. Hill and her student Carey A. Wilson of Lafayette College compared the levels of two key hormones in 15 college male-female couples before and after they kissed and before and after they talked to each other while holding hands. One hormone, oxytocin, is involved in social bonding, and the other, cortisol, plays a role in stress. Hill and Wilson predicted that kissing would boost levels of oxytocin, which also influences social recognition, male and female orgasm, and childbirth. They expected this effect to be particularly pronounced in the study's females, who reported higher levels of intimacy in their relationships.

They also forecast a dip in cortisol, because kissing is presumably a stress reliever.

But the researchers were surprised to find that oxytocin levels rose only in the males, whereas it decreased in the females, after either kissing or talking while holding hands. They concluded that females must require more than a kiss to feel emotionally connected or sexually excited during physical contact. Females might, for example, need a more romantic atmosphere than the experimental setting provided, the authors speculate. The study, which Hill and Wilson reported in November 2007 at the annual meeting of the Society for Neuroscience, revealed that cortisol levels dropped for both sexes no matter the form of intimacy, a hint that kissing does in fact reduce stress.

To the extent that kissing is linked to love, the act may similarly boost brain chemicals associated with pleasure, euphoria and a motivation to connect with a certain someone. In 2005 anthropologist Helen Fisher of Rutgers University and her colleagues reported scanning the brains of 17 individuals as they gazed at pictures of people with whom they were deeply in love. The researchers found an unusual flurry of activity in two brain regions that govern pleasure, motivation and reward: the right ventral tegmental area and the right caudate nucleus. Addictive drugs such as cocaine similarly stimulate these reward centers, through the release of the neurotransmitter dopamine. Love, it seems, is a kind of drug for us humans.

Kissing has other primal effects on us as well. Visceral marching orders boost pulse and blood pressure. The pupils dilate, breathing deepens and rational thought retreats, as desire suppresses both prudence and self-consciousness. For their part, the participants are probably too enthralled to care. As poet e. e. cummings once observed: “Kisses are a better fate / than wisdom.”

Litmus Test

Although a kiss may not be wise, it can be pivotal to a relationship. “One dance,” Alex “Hitch” Hitchens says to his client and friend in the 2005 movie *Hitch*, “one look, one kiss, that’s all we get . . . one shot, to make

the difference between ‘happily ever after’ and, ‘Oh? He’s just some guy I went to some thing with once.’”

Can a kiss be that powerful? Some research indicates it can be. In a survey Gallup and his colleagues found that 59 percent of 58 men and 66 percent of 122 women admitted there had been times when they were attracted to someone only to find that their interest evaporated after their first kiss. The “bad” kisses had no particular flaws; they simply did not feel right—and they ended the romantic relationship then and there—a kiss of death for that coupling.

The reason a kiss carries such weight, Gallup theorizes, is that it conveys subconscious information about the genetic compatibility of a prospective mate. His hypothesis is consistent with the idea that kissing evolved as a courtship strategy because it helps us rate potential partners.

From a Darwinian perspective, sexual selection is the key to passing on your genes. For us humans, mate choice often involves falling in love. Fisher wrote in her 2005 paper that this “attraction mechanism” in humans “evolved to enable individuals to focus their mating energy on specific others, thereby conserving energy and facilitating mate choice—a primary aspect of reproduction.”

According to Gallup’s new findings, kissing may play a crucial role in the progression of a partnership but one that differs between men and women. In a study published in September 2007 Gallup and his colleagues surveyed 1,041 college undergraduates of both sexes about kissing. For most of the men, a deep kiss was largely a way of advancing to the next level sexually. But women were generally looking to take the relationship to the next stage emotionally, assessing not simply whether the other person would make a first-rate source of DNA but also whether he would be a good long-term partner.

“Females use [kissing]....to provide information about the level of commitment if they happen to be in a continuing relationship,” Gallup told the BBC in his interview. The locking of lips is thus a kind of emotional barometer: the more enthusiastic it is, the healthier the relationship.

Because women need to invest more energy in producing children and have a shorter biological window in which to reproduce, they need to be

pickier about whom they choose for a partner—and they cannot afford to get it wrong. So, at least for women, a passionate kiss may help them choose a mate who is not only good at fathering children but also committed enough to stick around and raise them.

That said, kissing is probably not strictly necessary from an evolutionary point of view. Most other animals do not neck and still manage to produce plenty of offspring. Not even all humans kiss. At the turn of the 20th century Danish scientist Kristoffer Nyrop described Finnish tribes whose members bathed together but considered kissing indecent. In 1897 French anthropologist Paul d'Enjoy reported that the Chinese regard mouth-to-mouth kissing to be as horrifying as many people deem cannibalism to be. In Mongolia some fathers do not kiss their sons. (They smell their heads instead.)

In fact, up to 10 percent of humanity does not touch lips, according to human ethology pioneer Irenäus Eibl-Eibesfeldt, now head of the Max-Planck-Society Film Archive of Human Ethology in Andechs, Germany, writing in his 1970 book, *Love and Hate: The Natural History of Behavior Patterns*. Fisher published a similar figure in 1992. Their findings suggest that some 650 million members of the human species have not mastered the art of osculation, the scientific term for kissing; that is more than the population of any nation on earth except for China and India.

Lopsided Love

For those cultures that do kiss, however, osculation conveys additional hidden messages. Psychologist Onur Güntürkün of the Ruhr-University of Bochum in Germany recently surveyed 124 couples kissing in public places in the U.S., Germany and Turkey and found that they tilted their heads to the right twice as often as to the left before their lips touched. Right-handedness cannot explain this tendency, because being right handed is four times more common than is the act of kissing on the right. Instead Güntürkün suspects that right-tilted kissing results from a general preference that develops at the end of gestation and in infancy. This “behavioral asymmetry” is related to the lateralization of brain functions such as speech and spatial awareness.

Nurture may also influence our tendency to tilt to the right. Studies show that as many as 80 percent of mothers, whether right-handed or lefthanded, cradle their infants on their left side. Infants cradled, face up, on the left must turn to the right to nurse or nuzzle. As a result, most of us may have learned to associate warmth and security with turning to the right.

Some scientists have proposed that those who tilt their heads to the left when they kiss may be showing less warmth and love than those who tilt to the right. In one theory, tilting right exposes the left cheek, which is controlled by the right, more emotional half of the brain. But a 2006 study by naturalist Julian Greenwood and his colleagues at Stranmillis University College in Belfast, Northern Ireland, counters this notion. The researchers found that 77 percent of 240 undergraduate students leaned right when kissing a doll on the cheek or lips. Tilting to the right with the doll, an impassive act, was nearly as prevalent among subjects as it was among 125 couples observed osculating in Belfast; they tilted right 80 percent of the time. The conclusion: right-kissing probably results from a motor preference, as Güntürkün hypothesized, rather than an emotional one.

Despite all these observations, a kiss continues to resist complete scientific dissection. Close scrutiny of couples has illuminated new complexities woven throughout this simplest and most natural of acts—and the quest to unmask the secrets of passion and love is not likely to end soon. But romance gives up its mysteries grudgingly. And in some ways, we like it like that.

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(February/March 2008)

Turn It Up, Dear

by Gary Stix

A fundamental goal of neuroscience has always been to deduce the brain systems that underlie such basic drives as hunger, thirst and sex. In 1956 the well known physiologist James Olds wrote an article for *Scientific American*, called “Pleasure Centers in the Brain,” that described how a rat kept without food for a day was lured down a platform by a tasty meal. En route to dinner, it received a pleasurable electric shock. The rat never showed up for mealtime, instead choosing to delight in the arousal. With the optimism characteristic of that era, Olds concluded that stimulation experiments would lead to an understanding of neural functioning that would allow “one drug that will raise or lower thresholds in the hunger system, another for the sex-drive system, and so forth.”

Over fifty years later the promise of Olds’s vision has yet to fully materialize. Better drugs are needed to suppress appetite and spark sexual desire. But fascination has grown in recent years with taking Olds’s more direct route of stimulating the central nervous system.

So far no one has created anything like the Orgasmatron, first seen in Woody Allen’s 1973 comedy *Sleeper*. Undaunted, one clinician—who has trademarked the name Orgasmatron—ran a small, FDA-reviewed pilot trial to test the possibility of applying electric current to the spine to reverse sexual dysfunction. Stuart Meloy, a North Carolina physician who specializes in implanting spinal electrodes to alleviate pain, found by chance that a slightly off-kilter placement in the lower spine caused one woman to exclaim: “You’re going to have to teach my husband to do that.”

In 2006 Meloy reported that 10 of 11 women who stopped having or never had orgasms experienced sexual arousal with the temporary implant and, of that group, four had their ability to experience orgasm restored.

Meloy is seeking a medical device manufacturer to bring the costs down to \$12,000 for a permanent implant, about the charge for breast enlargement.

Neural electrodes may eventually move up the spinal cord to what is often characterized as the body's primary erogenous zone. Deep-brain stimulation, the placing of electrodes at strategic spots far underneath the skull, now treats a variety of ailments, including Parkinson's disease and dystonia (uncontrollable twisting of a body part caused by involuntary muscle contractions). An occasional side effect is spontaneous sexual stimulation.

Tipu Aziz, a neurosurgeon at the University of Oxford, speculates that better knowledge of the brain's pleasure centers—combined with improved surgical procedures and control of electrical pulses—may make a sex chip in the brain a reality. "Lack of sexual pleasure is a huge loss in one's life, and if one could restore that, that would enhance someone's quality of life enormously," Aziz remarks.

Some neuroscientists are not so sure. Morten L. Kringelbach, a researcher at Oxford who sometimes collaborates with Aziz and wrote the book *The Pleasure Center* (Oxford University Press, 2008), cautions that hedonic experience may consist of an impulse corresponding to "wanting" and another that represents "liking." To succeed as a therapy, a sex chip would have to address the challenge of switching on neural circuits that activate both impulses. In a 2008 paper in *Psychopharmacology* with University of Michigan at Ann Arbor psychologist Kent Berridge, Kringelbach illustrated the distinction between the two by citing an infamous case from the 1960s, in which psychiatrist Robert Heath placed "pleasure electrodes" in the brain of a gay man code-named B-19, in part, as an attempt to "cure" his homosexuality.

The patient pressed a button compulsively to turn on an electrode that induced a desire for sex, but whether he actually enjoyed the sensation was unclear. The stimulation alone did not induce orgasm, and B-19 never expressed any real contentment while hitting the button. Kringelbach warns against similar misuses of contemporary deep-brain stimulation. "It's important that we not get carried away by this technology," he says. "It's important that we not end up in another era of psychosurgeries,"

referring to the mid-20th century popularity of lobotomies to treat psychiatric disorders.

In the end, a sex chip may serve as a prop for moviemakers, but turning on the current may never become a truly practical means of adding the buzz back in your love life.

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Sex and the Secret Nerve

by R. Douglas Fields

We stood around the body planning our autopsy strategy. A scalpel, we realized, was not going to be the appropriate implement for this corpse, so we made our decision. It took all three of us to muscle the slippery black bulk of the pilot whale into the screaming blur of the band-saw blade.

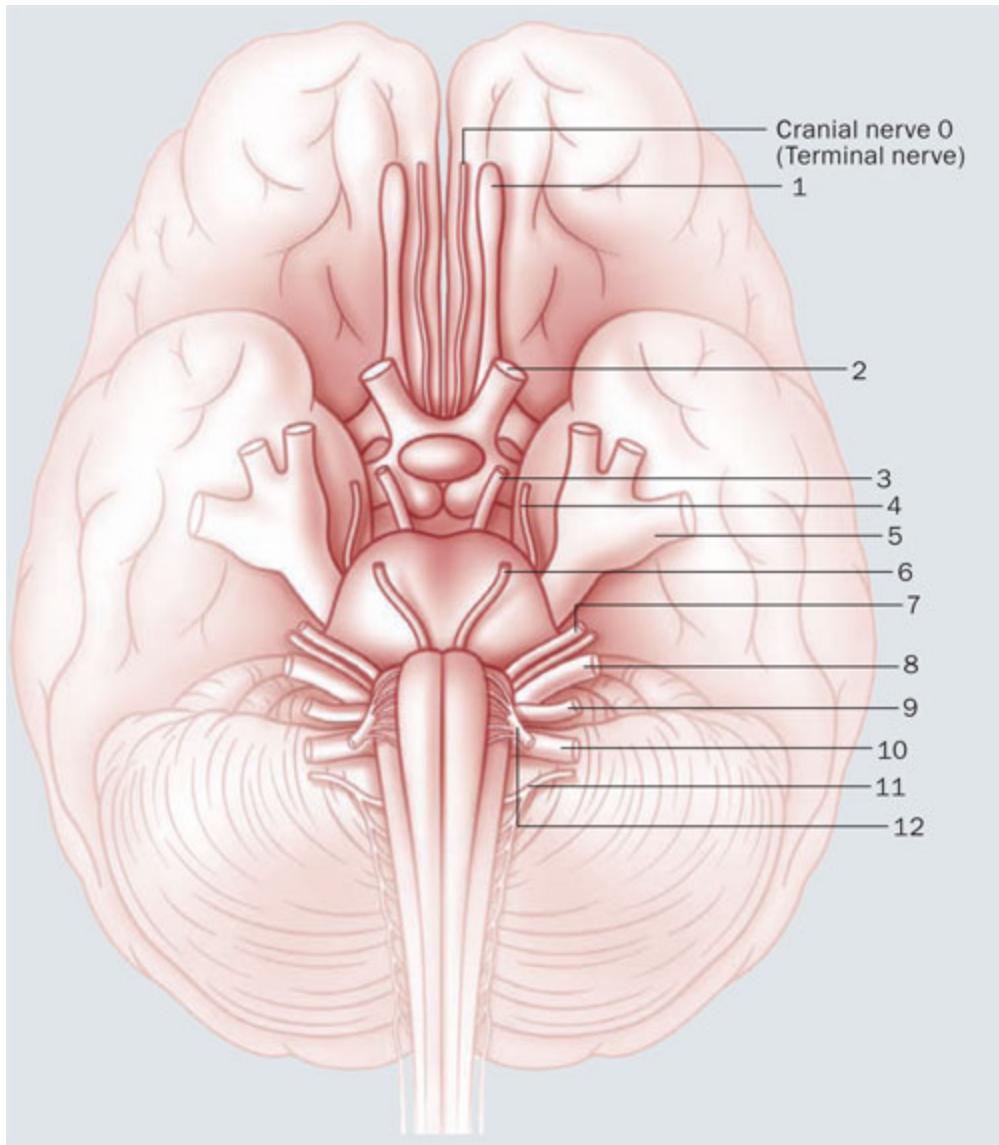
The whale had died of natural causes, after a distinguished military tenure conducting deep-sea operations for the U.S. Navy, which sends marine mammals to places where humans cannot safely go. In death, it was going to perform one more service—provide us with information about its magnificent brain. The navy had invited Scripps Institution of Oceanography researchers to come to its base in San Diego in the mid-1980s, and I had joined them. Dressed like fishmongers in black rubber smocks and boots, anatomist Leo S. Demski, visiting from the University of Kentucky, veterinarian Sam H. Ridgway of the Naval Oceans Systems Center and I sought to unravel a scientific mystery. It was imperative that we learn whether the whale had a certain cranial nerve—for reasons that will soon become apparent.

Every picture of the human brain you have seen is wrong. Something is missing, and the omission is not trivial. The dirty little secret is a tiny, relatively unstudied nerve sprouting from the base of the brain whose function is only now becoming clear: subliminal sexual attraction. Many scientists believe that pheromones, those silent chemical messages exchanged by members of the opposite sex in search of mates, relay subconscious signals to the brain through this obscure nerve. Others are skeptical. How can a little-studied nerve be involved in activities with such important implications for human behavior—especially when anatomists have scrutinized every minute detail of the human body for

centuries? Could there be more to choosing a mate than we consciously realize? Researchers like us have been working to find out.

Mysterious Nerve

Cranial nerves emerge from the floor of the brain in pairs; each pair is numbered from the front of the brain (closest to the forehead) to the back (near the spinal cord). Cranial nerve zero (also called the terminal nerve) is not in typical textbooks. Anatomists historically missed the thin nerve, perhaps because it is often inadvertently pulled off along with the tough membranes that wrap the brain.



Tracking this mysterious cranial nerve brought me to the pilot whale, as a model for understanding our fellow mammals. For reasons that I will

explain, it was particularly important to find out if this nerve exists in whales.

Most nerves enter the brain through the spinal cord, but some—the cranial nerves—enter the brain directly. The existence of some of the cranial nerves, if not their precise function, has been known since the time of Greek philosopher and physician Galen (who lived circa A.D. 129 to 210). Today we understand that they provide the vital senses of smell, sight, hearing, taste and touch; they are also involved in the movement of the eyes, jaw, tongue and face. Cranial nerves emerge from the floor of the brain in pairs, like a multilegged centipede. As every medical student knows, each nerve pair is numbered in sequence from the front of the brain (closest to the forehead) to the back (near the spinal cord).

Cranial nerve one is the olfactory nerve. All the scents of the world enter our brain through this nerve. Next, immediately behind the olfactory nerve, is cranial nerve two, the optic nerve. The optic nerve connects the eyes to the brain. The pairs continue in sequence to the 12th cranial nerve, which extends from the tongue and enters the brain near the spinal cord. Each pair was carefully identified, numbered and studied in detail. Then, in the late 1800s, neuroanatomists had their tidy understanding of cranial nerves attacked, so to speak, by a shark.

In 1878 German scientist Gustav Fritsch noticed a slender cranial nerve entering the brain of a shark just ahead of all the known nerves. No one else had noticed it before. Even today countless students in anatomy classes dissect dogfish sharks, but few detect the nerve because it is still not in the textbooks.

The discovery put anatomists in a predicament. Because it was located in front of the olfactory nerve, the new nerve should have been named cranial nerve one. But renumbering all the cranial nerves at this point was impossible, because their identities were deeply entrenched in the medical vocabulary. The solution was to christen this new find “nerve zero,” the “terminal nerve.” Most people forgot about it altogether. It just did not fit within the 12-nerve curriculum. And anyway, all five senses were accounted for by the other cranial nerves. How important could this little nerve be?

It would have been easier to overlook this inconvenient discovery if nerve zero were present only in sharks. But over the next century anatomists found the wispy nerve springing from the brain just in front of the olfactory nerve in almost all vertebrates (animals with backbones). To their chagrin, they found the nerve in humans, too, in 1913. Usually it is ripped away during dissection when the tough membranes that wrap the brain are peeled off, but if one knows where to look and is especially careful, the little nerve is always there. What is its purpose?

One clue comes from how it is connected in the brain. Like the olfactory nerve, nerve zero sends its endings to the nose. Perhaps, some researchers argue, this nerve is simply a frayed strand of the olfactory nerve and not a separate cranial nerve at all. The dead pilot whale, my colleagues and I realized, was a perfect opportunity to examine that notion by looking directly to an example from nature.

Whales and dolphins are unique in having a blowhole on the top of their head. Whales evolved from aquatic mammals that breathed through nostrils in the front of the face. Over the course of millions of years of evolution the nostrils gradually migrated to the top of their head. In the process, whales and dolphins gave up the sense of smell, and they lost their olfactory nerve. We realized that if nerve zero were also involved in the sense of smell—as just a twig branching off of the olfactory nerve—it, too, would have been abandoned in the evolutionary exchange of nostrils for blowhole. But if, as we suspected, nerve zero did something else, it might still be present in whales.

Before I relate the results of our autopsy, you must have a look at some of the evidence that raised our suspicions that nerve zero connects the sense of smell to sex.

Smell and Pheromones

Smell is the most ancient of all the senses—even the lowly bacterium must discern the difference between nutritious and noxious substances by sniffing (detecting chemicals in) its environs. Humans, who have a weak sense of smell compared with most mammals, nonetheless have 347 different types of sensory neurons in the olfactory epithelium, where cells for smell reside in the nose. Each one detects a different type of odor, and

all the varied aromas and stenches we know result from mixtures of responses of these 347 types of receptor cells. In comparison, every color we see results from signal combinations of only three types of sensory neurons in the retina (red-, green- or blue-sensitive cones), vision's sensing layer at the back of the eyes.

Animals rely heavily on the sense of smell and other nonverbal cues for communication. From frenzied June beetles to tomcats pursuing a queen in heat, pheromones are important for selecting mates and stimulating reproduction throughout the animal kingdom. A stallion curls its upper lip and inhales deeply to snuffle pheromones from a mare in heat, a behavior called flehmen. Many animals also rely on the sense of smell to determine sex, social rank, territories, reproductive status and even identity of specific individuals, such as their own mates or offspring.

Chemical Messages

What is it about sexual attraction that can instantly draw two people together? Could pheromones be a factor for human couples, as they are for other animals? Research on molecules that protect us from infections offers intriguing clues.

In many animals, the nose can determine sex and reproductive status by sensing trace hormones and other compounds in urine and sweat. A different class of molecules provides information about the individual identity of a mate. Such macromolecules, called major histocompatibility complex (MHC) proteins, sit on the surface of cells to allow the immune system to distinguish the body's own cells from foreign ones.

Here is how it works. MHC molecules are huge proteins equipped with bird-beak-like appendages that snatch small protein fragments inside cells and poke them through the cell membrane for guard patrols called T cells to inspect. If the protein fragments are foreign, the immune system attacks.

Some studies suggest that people can discern whether someone has different MHC genes. Biologist Claus Wedekind of the University of Edinburgh reported in the mid-1990s that in one study women preferred the odor of T-shirts worn two nights by men who had different MHC genes from their own; men had the same ability to distinguish MHC genes by smell. In a 1997 study geneticist Carole Ober of the University of Chicago and her colleagues reported that people avoid mating with individuals carrying the type of MHC genes most similar to those of their own mothers.

It makes good evolutionary sense to mate with someone who has a different set of MHC genes, because doing so increases the arsenal of immune system genes in your children and thus allows them to better resist infection. It is also biologically important to diminish sexual arousal toward one's own family members, who are most likely to share your variety of MHC genes. The Wedekind and Ober studies suggest that an individual's odor is affected by the particular variety of MHC genes he or she has. This effect may come about because differences in an individual's immune system alter the body's bacterial flora and, in turn, the resulting odors created by the breakdown of sweat and apocrine gland secretions by these bacteria. But would nature leave such a

vital process as mate selection under the control of microbes, which can change with infections and other environmental influences?

As it turns out, it is not the MHC protein itself that is the pheromone. Recent research indicates that it is the small protein fragment clutched in the jaws of the MHC molecule. In 2004 neurobiologist Trese Leinders-Zufall of the University of Maryland School of Medicine and her colleagues found that when synthetic protein fragments that are more readily picked up by classes of MHC proteins in unfamiliar mice were added to the urine of the female mouse's mate, pregnancy was blocked just as if she had been exposed to urine from an unfamiliar male mouse.

Credit: R. Douglas Fields

In humans, mate selection and sexual reproduction are far more complex, but there are indications that people do exchange such secret pheromone messages. We will examine the evidence—some of it reported only in the past few months—but for now it is sufficient to appreciate that pheromones differ in two important ways from the chemicals that excite our sense of smell. For a smell to waft a distance from its source, the odor-producing molecules must be very small and volatile (able to float great distances in the air). Not so for pheromones, which can be large molecules passed between the noses of individuals during intimate contact, such as kissing.

Second, not all pheromones have an odor. If pheromones were to excite nerve endings that convey their signals directly to brain regions controlling sexual reproduction, bypassing the cerebral cortex where consciousness arises, they could act like an unseen olfactory cupid—putting a romantic twinkle in the eye of a certain member of the opposite sex—and we would never know it.

As it turns out, nerve zero's connections in the brain leave open that very possibility. To explain how requires a more detailed look at the circuitry for the sense of smell and for a special structure in the nose of many animals that detects pheromones, called the vomeronasal organ.

The olfactory nerve connects sense cells in our nose to the olfactory bulb inside our skull. This neural bulb is a massive relay point containing a nest of synapses. Raw incoming sensory information from the 347 kinds of odor receptors is first sorted here, then processed to analyze and discriminate among the universe of odors. The signals next pass to the olfactory cortex for finer discrimination and conscious perception of the odor.

For many animals that rely on pheromones for sexual communication, the key place for sensing these chemicals is a specialized area inside the nasal cavity known as the vomeronasal organ. This organ, in turn, is connected to a tiny “accessory” olfactory bulb, next to the main olfactory bulb involved in the sense of smell. From there, nerves connect to areas of the brain involved in sexual arousal (such as the amygdala) rather than to the olfactory cortex. In rodents, for example, stimulating the vomeronasal organ with pheromones can release a flood of sex hormones into the blood.

Acting through the vomeronasal organ, pheromones influence the frequency of estrus and stimulate sexual behavior and ovulation in animals. The wrong pheromones can even terminate a pregnancy. In 1959 Hilda M. Bruce of the National Institute for Medical Research in London reported that an embryo will not implant in the uterus of a recently mated female mouse if she is exposed to the smell of urine from an unfamiliar male. Instead the embryo will be aborted, and the female will return to estrus. In contrast, the smell of urine from her mate does not prevent implantation and pregnancy.

In research published in 2006, Nobel laureate Linda Buck and her colleague Stephen Liberles of the Fred Hutchinson Cancer Research Center in Seattle identified 15 members of a new family of receptor proteins. These receptors, found in the mouse nose, exist on the surface of sense cells that detect pheromones, lending credence to the idea of a separate pathway for pheromones in mammals. These cells are different from the receptors that detect odors. Each of the newly discovered TAARs (trace amine-associated receptors) responds selectively to specific nitrogencontaining molecules in mouse urine. The concentration of one of these chemicals increases in mouse—and human—urine under the stresses associated with mating behavior, such as those involving dominance and submission. Two of the TAARs are excited by compounds found exclusively in the urine of male mice, but only after puberty, also suggesting a sex link. Incidentally, behavioral researchers had previously identified one of these compounds and found that it accelerated the onset of puberty in female mice.

We now have an understanding of pheromones in mice that extends from molecules to sexual behavior, but what about pheromones in humans?

Intriguingly, Buck found that humans have the genes to make at least six of the same pheromone receptors present in mice.

Nerve Zero's Role

Although some scientists claim to have detected an operational vomeronasal organ in humans as well, most believe that it appears to be vestigial. As is the case with gill slits, we possess vomeronasal organs only during our fetal lives, after which they atrophy. So if pheromones are sending sexual signals to human brains, they are not relying on the vomeronasal organ to relay them. Instead nerve zero might be stepping into the breach.

Consider the following anatomical features of nerve zero. Like its olfactory cousin, nerve zero has its endings in the nasal cavity, but remember that it sends its nerve fibers to the hot-button sex regions of the brain: the medial and lateral septal nuclei and preoptic areas. These regions of the brain are concerned with the “nuts and bolts” of reproduction. They control release of sex hormones and other irresistible urges such as thirst and hunger. The septal nucleus can act on and be influenced by the amygdala, hippocampus and hypothalamus. Damage to the septal nuclei causes behavioral changes in sexual behavior, feeding, drinking and rage reactions. Thus, in connecting the nose to the reproductive centers of the brain, nerve zero completely bypasses the olfactory bulb.

Cutting the olfactory nerve or removing the vomeronasal organ will disrupt normal mating behavior in rodents, suggesting that the olfactory nerve transmits pheromone messages from the vomeronasal organ. But in the past few years, researchers have come to understand that nerve zero also sends fibers to the vomeronasal organ—and that nerve zero’s fibers run extremely close to the fibers of the olfactory nerve. As a result, in experiments in which the olfactory nerve was deliberately severed, investigators may have inadvertently cut through nerve zero as well.

In 1987 neuroscientist Celeste Wirsig, then at Baylor College, carefully severed the nerve zero of male hamsters, leaving the olfactory nerve unscathed (as shown by the fact that hamsters with a severed nerve zero

could find a hidden cookie just as fast as control animals could). The hamsters with a severed nerve zero failed to mate.

Similarly, in 1980, neuroscientists observed that electrically stimulating the olfactory nerve could trigger sexual responses in fish and other animals. But could this sexual behavior actually result from a stimulated nerve zero, which runs close to the olfactory nerve for most of its length? Neuroanatomists R. Glenn Northcutt suspected as much. They also knew that on their way to the brain, some fibers in nerve zero took an unexpected side trip and sent branches to the retinas of the eyes. This may seem odd until you realize that for most plants and animals, reproduction is seasonal—and day length is the most accurate way to gauge time of year. Many scientists suspect that a nerve involved in mating and reproduction might also connect to the retina to keep a constant check on the calendar. Regardless of function, this place was where nerve zero and the olfactory nerve parted company, so Northcutt and Demski were able to apply a mild electric shock to goldfish nerve zero fibers in this site without stimulating the olfactory nerve at the same time. When they did, the male goldfish responded instantly by releasing sperm.

So in addition to the anatomical evidence that nerve zero connected the nose to parts of the brain controlling sexual reproduction, strong physiological evidence now existed that—in fish at least—nerve zero might be a sensory system for responding to sex pheromones and regulating reproductive behavior. Another lead pointing to a sexual role for nerve zero would come from my own research, again on a creature from the sea.

In 1985, while studying nerve zero of a stingray using the electron microscope, I saw something peculiar: many of its axons (nerve fibers) were stuffed with what looked like minuscule black spheres. They turned out to be peptide hormones packed tightly together like pellets in a shotgun shell. And at the tips of some of these nerves I observed the release of these hormones and their uptake by tiny blood vessels—suggesting that nerve zero may in fact be a neurosecretory organ, meaning that it regulates reproduction by releasing hormones in much the same way as the pituitary gland does. This new clue that the terminal nerve released sex hormones, together with the knowledge that it connected the

nose to parts of the brain controlling sexual reproduction, triangulated on one conclusion: pheromones.

Yet skeptical scientists have credited arousal exclusively to the olfactory nerve, still arguing that nerve zero is not a separate cranial nerve at all but simply a frayed strand of the olfactory nerve. So when Demski and I heard that a pilot whale had just died at the San Diego Naval Base, we jumped at the chance to examine it. This animal could show us whether nerve zero was truly autonomous and might even help to illuminate its function.

Whale of a Find

Back in the lab at Scripps, Demski reached into a plastic bucket with gloved hands and withdrew the pilot whale's brain that we had removed from the immense carcass. It was about the size of a soccer ball and resembled a human brain, except that its cerebral cortex had tighter and more numerous convolutions—almost kinky in comparison to the wavy folds of a human cortex.

After turning over the whale brain for a look at its underside, we were struck by the strangeness of seeing a mammalian brain devoid of its olfactory nerves. (Remember that whales lost their sense of smell in exchange for blowholes.) Demski carefully peeled away the membranes from the area in which we expected to find a pair of nerve zeros, assuming they had not been lost along with the olfactory nerves. With the surprise of unwrapping a present, we found them: two slender white nerves headed toward the whale's blowhole.

Our postmortem on the pilot whale had proved that nerve zero was a distinct neural entity, not just a fragment of the olfactory nerve. And for whales and dolphins, which had sacrificed their sense of smell and the olfactory nerves that made it possible, whatever nerve zero did was too precious to survival for evolution to abandon.

Despite the intriguing findings, nerve zero's role in the sexual behavior of humans remains unclear. Recent research in mice has revealed the presence of certain sensory neurons that are not associated with the vomeronasal organ but that respond to pheromone stimulation. So even without a functioning vomeronasal organ, our noses may nonetheless contain sensory neurons capable of responding to pheromones.

How much of this labor is split between the olfactory nerve and nerve zero is not yet worked out. Obviously, nerve zero is doing something different with the information it is receiving from the nose, because it does not connect to the olfactory bulb where smells are analyzed. Moreover, it connects to parts of the brain controlling reproduction, and it releases a powerful sex hormone (GnRH) into the blood. Nerve zero develops very early in embryos, and studies show that all the neurons in the forebrain that produce GnRH use the fetal nerve zero as a pathway to migrate along to find their proper place in the brain. When this embryonic pathway is disrupted, Kallmann's syndrome is the result. This disorder not only impairs people's sense of smell, it leaves them unable to mature sexually beyond puberty. Undoubtedly, nerve zero has other functions in addition to reproduction—most cranial nerves transmit both sensory and motor (related to body movement) traffic. Electrical impulses have been detected traveling out from the brain through nerve zero, but what the outgoing messages do is unknown.

Ultimately, more research will be needed to fully detail nerve zero's role in the brain. But at least now you understand that nature provides a hidden channel of communication between the sexes to sustain the cycle of life, and scientists know where to begin to solve this intriguing puzzle. This secret nerve, missing from textbooks but shared by creatures from sharks to people, remains, like the intimate function it serves, still wrapped in secrecy.

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The Orgasmic Mind

by Martin Portner

She did not often have such strong emotions. But she suddenly felt powerless against her passion and the desire to throw herself into the arms of the cousin whom she saw at a family funeral. “It can only be because of that patch,” said Marianne, a participant in a multinational trial of a testosterone patch designed to treat hypoactive sexual desire disorder, in which a woman is devoid of libido. Testosterone, a hormone ordinarily produced by the ovaries, is linked to female sexual function, and the women in this 2005 study had undergone operations to remove their ovaries.

After 12 weeks of the trial, Marianne had felt her sexual desire return. Touching herself unleashed erotic sensations and vivid sexual fantasies. Eventually she could make love to her husband again and experienced an orgasm for the first time in almost three years. But that improvement was not because of testosterone, it turned out. Marianne was among the half of the women who had received a placebo patch—with no testosterone in it at all.

Marianne’s experience underlines the complexity of sexual arousal. Far from being a simple issue of hormones, sexual desire and orgasm are subject to various influences on the brain and nervous system, which controls the sex glands and genitals. And many of those influences are environmental. Recent research, for example, shows that visual stimuli spur sexual stirrings in women, as they do in men. Marianne’s desire may have been invigorated by conversations or thoughts about sex she had as a result of taking part in the trial. Such stimuli may help relieve inhibitions or simply whet a person’s appetite for sex.

Achieving orgasm, brain-imaging studies show, involves more than heightened arousal. It requires a release of inhibitions and control in which the brain's center of vigilance shuts down in males; in females, various areas of the brain involved in controlling thoughts and emotions become silent. The brain's pleasure centers tend to light up brightly in the brain scans of both sexes, especially in those of males. The reward system creates an incentive to seek more sexual encounters, with clear benefits for the survival of the species. When the drive for sex dissipates, as it did with Marianne, people can reignite the spark with tactics that target the mind.

Sex in Circles

Biologists identified sex hormones such as estrogen and testosterone in the 1920s and 1930s, and the first studies of human sexuality appeared in the 1940s. In 1948 biologist Alfred Kinsey of Indiana University introduced his first report on human sexual practices, *Sexual Behavior in the Human Male*, which was followed, in 1953, by *Sexual Behavior in the Human Female*. These highly controversial books opened up a new dialogue about human sexuality. They not only broached topics—such as masturbation, homosexuality and orgasm—that many people considered taboo but also revealed the surprising frequency with which people were coupling and engaging in sexual relations of countless varieties.

Kinsey thus debuted sex as a science, paving the way for others to dig below statistics into the realm of biology. In 1966 gynecologist William Masters and psychologist Virginia Johnson—who originally hailed from Washington University before founding their own research institute in St. Louis—described for the first time the sexual response cycle (how the body responds to sexual stimulation), based on observations of 382 women and 312 men undergoing some 10,000 such cycles. The cycle begins with excitation, as blood rushes to the penis in men, and as the clitoris, vulva and vagina enlarge and grow moist in women. Gradually, people reach a plateau, in which they are fully aroused but not yet at orgasm. After reaching orgasm, they enter the resolution phase, in which the tissues return to the preexcitation stage.

In the 1970s psychiatrist Helen Singer Kaplan of the Human Sexuality Program at Weill Medical College of Cornell University added a critical element to this cycle—desire—based on her experience as a sex therapist.

In her three-stage model, desire precedes sexual excitation, which is then followed by orgasm. Because desire is mainly psychological, Kaplan emphasized the importance of the mind in the sexual experience and the destructive forces of anxiety, defensiveness and failure of communication.

In the late 1980s gynecologist Rosemary Basson of the University of British Columbia proposed a more circular sexual cycle, which, despite the term, had been described as a largely linear progression in previous work. Basson suggested that desire might both lead to genital stimulation and be invigorated by it. Countering the idea that orgasm is the pinnacle of the experience, she placed it as a mere spot on the circle, asserting that a person could feel sexually satisfied at any of the stages leading up to an orgasm, which thus does not have to be the ultimate goal of sexual activity.

Dissecting Desire

Given the importance of desire in this cycle, researchers have long wanted to identify its key ingredients. Conventional wisdom casts the male triggers in simplistic sensory terms, with tactile and visual stimuli being particularly enticing. Men are drawn to visual erotica, explaining the lure of magazines such as *Playboy*. Meanwhile female desire is supposedly fueled by a richer cognitive and emotional texture. “Women experience desire as a result of the context in which they are inserted—whether they feel comfortable with themselves and the partner, feel safe and perceive a true bond with the partner,” opines urologist Jennifer Berman of the Female Sexual Medicine Center at the University of California, Los Angeles.

Yet sexual imagery devoid of emotional connections can arouse women just as it can men, a 2007 study shows. Psychologist Meredith Chivers of the Center for Addiction and Mental Health in Toronto and her colleagues gauged the degree of sexual arousal in about 100 women and men, both homosexual and heterosexual, while they watched erotic film clips. The clips depicted same-sex intercourse, solitary masturbation or nude exercise—performed by men and women—as well as male-female intercourse and mating between bonobos (close ape relatives of the chimpanzee).

The researchers found that although nude exercise genitally aroused all the onlookers the least and intercourse excited them the most, the type of actor was more important for the men than for the women. Heterosexual women's level of arousal increased along with the intensity of the sexual activity largely irrespective of who or what was engaged in it. In fact, these women were genitally excited by male and female actors equally and also responded physically to bonobo copulation. (Gay women, however, were more particular; they did not react sexually to men masturbating or exercising naked.)

The men, by contrast, were physically titillated mainly by their preferred category of sexual partner—that is, females for straight men and males for gay men—and were not excited by bonobo copulation. The results, the researchers say, suggest that women are not only aroused by a variety of types of sexual imagery but are more flexible than men in their sexual interests and preferences.

When it comes to orgasm, simple sensations as well as higher-level mental processes probably also play a role in both sexes. Although Kinsey characterized orgasm in purely physical terms, psychologist Barry R. Komisaruk of Rutgers University has defined the experience as more multifaceted. In their book *The Science of Orgasm* (Johns Hopkins University Press, 2006), Komisaruk, endocrinologist Carlos Beyer-Flores of the Tlaxcala Laboratory in Mexico and Rutgers sexologist Beverly Whipple describe orgasm as maximal excitation generated by a gradual summing of responses from the body's sensory receptors, combined with complex cognitive and emotional forces. Similarly, psychologist Kent Berridge of the University of Michigan at Ann Arbor has described sexual pleasure as a kind of “gloss” that the brain's emotional hub, the limbic system, applies over the primary sensations.

The relative weights of sensory and emotional influences on orgasm may differ between the sexes, perhaps because of its diverging evolutionary origins. Orgasm in men is directly tied to reproduction through ejaculation, whereas female orgasm has a less obvious evolutionary role. Orgasm in a woman might physically aid in the retention of sperm, or it may play a subtler social function, such as facilitating bonding with her mate. If female orgasm evolved primarily for

social reasons, it might elicit more complex thoughts and feelings in women than it does in men.

Forgetting Fear

But does it? Researchers are trying to crack this riddle by probing changes in brain activity during orgasm in both men and women. Neuroscientist Gert Holstege of the University of Groningen in the Netherlands and his colleagues attempted to solve the male side of the equation by asking the female partners of 11 men to stimulate their partner's penis until he ejaculated while they scanned his brain using positron-emission tomography (PET). During ejaculation, the researchers saw extraordinary activation of the ventral tegmental area (VTA), a major hub of the brain's reward circuitry; the intensity of this response is comparable to that induced by heroin. "Because ejaculation introduces sperm into the female reproductive tract, it would be critical for reproduction of the species to favor ejaculation as a most rewarding behavior," the researchers wrote in 2003 in *The Journal of Neuroscience*.

The scientists also saw heightened activity in brain regions involved in memory-related imagery and in vision itself, perhaps because the volunteers used visual imagery to hasten orgasm. The anterior part of the cerebellum also switched into high gear. The cerebellum has long been labeled the coordinator of motor behaviors but has more recently revealed its role in emotional processing. Thus, the cerebellum could be the seat of the emotional components of orgasm in men, perhaps helping to coordinate those emotions with planned behaviors. The amygdala, the brain's center of vigilance and sometimes fear, showed a decline in activity at ejaculation, a probable sign of decreasing vigilance during sexual performance.

To find out whether orgasm looks similar in the female brain, Holstege's team asked the male partners of 12 women to stimulate their partner's clitoris—the site whose excitation most easily leads to orgasm—until she climaxed, again inside a PET scanner. Not surprisingly, the team reported in 2006, clitoral stimulation by itself led to activation in areas of the brain involved in receiving and perceiving sensory signals from that part of the body and in describing a body sensation—for instance, labeling it "sexual."

But when a woman reached orgasm, something unexpected happened: much of her brain went silent. Some of the most muted neurons sat in the left lateral orbitofrontal cortex, which may govern self-control over basic desires such as sex. Decreased activity there, the researchers suggest, might correspond to a release of tension and inhibition. The scientists also saw a dip in excitation in the dorsomedial prefrontal cortex, which has an apparent role in moral reasoning and social judgment—a change that may be tied to a suspension of judgment and reflection.

Brain activity fell in the amygdala, too, suggesting a depression of vigilance similar to that seen in men, who generally showed far less deactivation in their brain during orgasm than their female counterparts did. “Fear and anxiety need to be avoided at all costs if a woman wishes to have an orgasm; we knew that, but now we can see it happening in the depths of the brain,” Holstege says. He went so far as to declare at the 2005 meeting of the European Society for Human Reproduction and Development: “At the moment of orgasm, women do not have any emotional feelings.”

But that lack of emotion may not apply to all orgasms in women. Komisaruk, Whipple and their colleagues studied the patterns of brain activation that occur during orgasm in five women with spinal cord injuries that left them without sensation in their lower extremities. These women were able to achieve a “deep,” or nonclitoral, orgasm through mechanical stimulation (using a laboratory device) of the vagina and cervix. But contrary to Holstege’s results, Komisaruk’s team found that orgasm was accompanied by a general activation of the limbic system, the brain’s seat of emotion.

Among the activated limbic regions were the amygdala and the hypothalamus, which produces oxytocin, the putative love and bonding hormone whose levels jump fourfold at orgasm. The researchers also found heightened activity in the nucleus accumbens, a critical part of the brain’s reward circuitry that may mediate orgasmic pleasure in women. In addition, they saw unusual activity in the anterior cingulate cortex and the insula, two brain areas that Rutgers anthropologist Helen Fisher has found come to life during the later stages of love relationships. Such activity

may connect a female's sexual pleasure with the emotional bond she feels with her partner.

Domestic Bliss

Is the pursuit of sexual gratification vital to the health of an established relationship? In her book *Mating in Captivity* (HarperCollins, 2006), New York-based psychotherapist Esther Perel emphasizes the importance of eroticism and orgasm in a marriage. She chronicles the typical dissolution of a couple's sex life when the love bond becomes politically correct and excessively domesticated. To avoid sexual staleness, Perel advocates unusual strategies such as cultivating separateness—developing different interests and groups of friends from those of your partner, for example—instead of closeness, as a way of making your partner more mysterious and exciting. She also suggests looking for creative ways to let fantasy and even a little craziness thrive within the confines of a long-term relationship.

Other psychologists, however, advise against placing too much emphasis on orgasm in a mature relationship. In her book *Peace Between the Sheets* (Frog Books, 2003), couples therapist Marnia Robinson suggests that the journey to orgasm renders us prisoners to dopamine, a neurotransmitter secreted in the brain's reward centers. After all, dopamine underlies other addictive behaviors, from gambling to drug abuse. In Robinson's view, partners should mutually unite in pleasure, without the sexual relationship necessarily having to be crowned by orgasm.

Credit: Martin Portner

Pleasure Pill?

Disentangling the connections between orgasm, reproduction and love may someday yield better medications and psychotherapies for sexual problems. As Marianne's case illustrates, the answer is usually not as simple as a hormone boost. Instead her improvement was probably the result of the activation or inactivation of relevant parts of her brain by social triggers she encountered while participating in an experiment whose purpose centered on female sexual arousal. Indeed, many sex therapies revolve around opening the mind to new ways of thinking about sex or about your sexual partner.

Companies are also working on medications that act on the nervous system to stimulate desire. One such experimental compound is a peptide called bremelanotide, which is under development by Palatin Technologies in Cranbury, N.J. It blocks certain receptors in the brain that are involved in regulating basic drives such as eating and sex. In human studies bremelanotide has prompted spontaneous erections in men and boosted sexual arousal and desire in women, but the U.S. Food and Drug

Administration has held up its progress out of concern over side effects such as rising blood pressure.

Continued scientific dissection of the experience of orgasm may lead to new pharmaceutical and psychological avenues for enhancing the experience. Yet overanalyzing this moment of intense pleasure might also put a damper on the fun. That is what the science tells us anyway.

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SECTION 5

Gender, Sexuality and Choice

Is Your Child Gay?

by Jesse Bering

We all know the stereotypes: an unusually light, delicate, effeminate air in a little boy's step, an interest in dolls, makeup, princesses and dresses, and a strong distaste for rough play with other boys. In little girls, there is the outwardly boyish stance, perhaps a penchant for tools, a square-jawed readiness for physical tussles with boys, and an aversion to all the perfumed, delicate trappings of femininity.

These behavioral patterns are feared, loathed and often spoken of directly as harbingers of adult homosexuality. It is only relatively recently, however, that developmental scientists have conducted controlled studies to identify the earliest and most reliable signs of adult homosexuality. In looking carefully at the childhoods of gay adults, researchers are finding an intriguing set of behavioral indicators that homosexuals seem to have in common. Curiously enough, the age-old homophobic fears of many parents reflect some genuine predictive currency.

J. Michael Bailey and Kenneth J. Zucker, both psychologists, published a seminal paper on childhood markers of homosexuality in 1995. Bailey and Zucker examined sex-typed behavior—that long, now scientifically canonical list of innate sex differences in the behaviors of young males versus young females. In innumerable studies, scientists have documented that these sex differences are largely impervious to learning. They are also found in every culture examined. Of course, there are exceptions to the rule; it is only when comparing the aggregate data that sex differences leap into the stratosphere of statistical significance.

The most salient differences are in the domain of play. Boys engage in what developmental psychologists refer to as “rough-and-tumble play.” Girls prefer the company of dolls to a knee in the ribs. Toy interests are

another key sex difference, with boys gravitating toward toy machine guns and monster trucks and girls orienting toward baby dolls and hyperfeminized figurines. Young children of both sexes enjoy pretend play, but the roles within the fantasy context are gender-segregated by age two. Girls enact the role of, say, cooing mothers, ballerinas or fairy princesses, and boys prefer to be soldiers and superheroes. Not surprisingly, therefore, boys naturally select other boys for playmates, and girls would much rather play with other girls.

So on the basis of some earlier, shakier research, along with a good dose of common sense, Bailey and Zucker hypothesized that homosexuals would show an inverted pattern of sex-typed childhood behaviors—little boys preferring girls as playmates and becoming infatuated with their mother's makeup kit; little girls strangely enamored of field hockey or professional wrestling—that sort of thing. Empirically, the authors explain, there are two ways to investigate this hypothesis, with either a prospective or retrospective study. Using the prospective method, young children displaying sex-atypical patterns are followed into adolescence and early adulthood so that their sexual orientation can be assessed at maturity.

This method is not terribly practical for several reasons. Given that a small proportion of the population is homosexual, prospective studies require a large number of children. This approach also takes a long time, around 16 years. Finally, not a lot of parents are likely to volunteer their children. Right or wrong, this is a sensitive topic, and usually it is only children who present significant sexatypical behaviors who are brought into clinics and whose cases are made available to researchers.

Rough-and-Tumble Girls

For example, in a 2008 study psychologist Kelley Drummond and her colleagues interviewed 25 adult women who were referred by their parents for assessment at a mental health clinic when they were between three and 12 years old. At the time, all these girls had several diagnostic indicators of gender identity disorder. They might have strongly preferred male playmates, insisted on wearing boys' clothing, favored rough-and-tumble play, stated that they would eventually grow a penis or refused to urinate in a sitting position. Although only 12 percent of these women grew up to

be gender dysphoric (the uncomfortable sense that your biological sex does not match your gender), the odds of these women reporting a bisexual or homosexual orientation were up to 23 times higher than would occur in a general sample of young women. Not all tomboys become lesbians, of course, but these data suggest that lesbians often have a history of cross-sex-typed behaviors.

And the same holds for gay men. Bailey and Zucker, who conducted a retrospective study in which adults answered questions about their past, revealed that 89 percent of randomly sampled gay men recalled cross-sex-typed childhood behaviors exceeding the heterosexual median.

Critics have argued that participants' memories may be distorted to fit with societal expectations and stereotypes. But in a clever study published in 2008 in *Developmental Psychology*, evidence from childhood home videos validated this retrospective method. People blindly coded child targets on the latter's sex-typical behaviors, as shown on the screen. The authors found that "those targets who, as adults, identified themselves as homosexual were judged to be gender nonconforming as children."

Numerous studies have since replicated this general pattern, revealing a strong link between childhood deviations from gender role norms and adult sexual orientation. There is also evidence of a "dosage effect": the more gender-nonconforming characteristics there are in childhood, the more likely it is that a homosexual or bisexual orientation will be present in adulthood.

Not all little boys who like to wear dresses grow up to be gay, nor do all little girls who despise dresses become lesbians. Many will be straight, and some, let's not forget, will be transsexuals. I was rather androgynous, showing a mosaic pattern of sex-typical and atypical behaviors. In spite of my parents' preferred theory that I was simply a young Casanova, Zucker and Bailey's findings may account for that old Polaroid snapshot in which 11 of the 13 other children at my seventh birthday party are little girls. But I wasn't an overly effeminate child, was never bullied as a "sissy" and, by the time I was 10, was indistinguishably as annoying, uncouth and wired as my close male peers.

On the Monkey Bars

In fact, by age 13, I was deeply socialized into masculine norms. I took to middle school wrestling as a rather scrawny 80-pound eighth grader, and in so doing, ironically became all too conscious of my homosexual orientation.

Cross-cultural data show that prehomosexual boys are more attracted to solitary sports such as swimming, cycling and tennis than they are to rougher contact sports such as football and soccer; they are also less likely to be childhood bullies. In any event, I distinctly recall being with the girls on the monkey bars during recess in second grade while the boys were in the field playing football and looking over at them, thinking to myself how that was rather strange. I wondered why anyone would want to act that way.

Researchers readily concede that there are quite likely multiple—and no doubt extremely complicated—developmental routes to adult homosexuality. Heritable, biological factors interact with environmental experiences to produce sexual orientation. Because the data often reveal very early emerging traits in prehomosexuals, children who show pronounced sex-atypical behaviors may have more of a genetic loading to their homosexuality, whereas gay adults who were sex-typical as children might trace their homosexuality more directly to particular childhood experiences.

Then we arrive at the most important question of all. Why do parents worry so much about whether their child may or may not be gay? All else being equal, I suspect we would be hard-pressed to find parents who would actually prefer their offspring to be homosexual. Evolutionarily, parental homophobia is a nobrainer: gay sons and lesbian daughters are not likely to reproduce (unless they get creative).

But bear this in mind, parents, there are other ways for your child to contribute to your overall genetic success than humdrum sexual reproduction. I don't know how much money or residual fame is trickling down to, say, k. d. lang, Elton John and Rachel Maddow's close relatives, but I can only imagine that these straight kin are far better off in terms of their own reproductive opportunities than they would be without a homosexual dangling so magnificently on their family trees. So cultivate your little prehomosexual's native talents, and your ultimate genetic

payoff could, strangely enough, be even larger with one very special gay child than it would be if 10 mediocre straight offspring leaped from your loins.

If researchers eventually perfect the forecasting of adult sexual orientation in children, would parents want to know? I can say as a once prehomosexual pipsqueak that some preparation on the part of others would have made it easier on me, rather than constantly fearing rejection or worrying about some careless slipup leading to my “exposure.” It would have at least avoided all those awkward, incessant questions during my teenage years about why I wasn’t dating a nice pretty girl (or questions from the nice pretty girl about why I was dating her and rejecting her advances).

And another thing: it must be pretty hard to look into your prehomosexual toddler’s limpid eyes, brush away the cookie crumbs from her cheek and toss her out on the streets for being gay.

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Do Gays Have a Choice?

by Robert Epstein

On a typical summer Saturday morning Matt Avery and his wife, Sheila (not their real names), cook breakfast with their two sons, ages five and eight. Then they get organized with towels, goggles and water wings and load the family into the car for an afternoon at the pool. "Weekends are all about family time," Matt says.

Matt and Sheila have been happily married for over ten years. "She's my soul mate," Matt says. "I wouldn't trade my life for the world."

But some people would claim that Matt's life is based on an illusion—that he could not possibly be a dedicated husband and father. Why? Because Matt used to be gay.

According to the National Gay and Lesbian Task Force and at least a few experts, gays do not have a choice about their sexual orientation. If a man or a woman is born gay, he or she will always be gay. Because Matt was gay for most of his young adulthood (ages 17 to 24), the thinking goes, he must *still* be gay. Pressured by a homomisic society—a society that dislikes and shuns gays—Matt has simply run back inside the closet. Gay activists favor this perspective at least in part because survey data show that people are more sympathetic to gay causes if they believe that sexual orientation is immutable.

The public disclosure by James McGreevey, who announced at an August 2004 press conference that he was resigning as governor of New Jersey, seems to support this view. With his beautiful wife at his side, McGreevey revealed that he was about to be sued by another male for sexual harassment. His announcement suggested, at least to some, that he

had always been gay and that his two marriages and two children were somehow less than valid.

Does this perspective have merit? Or are religious conservatives correct in asserting that homosexuality is entirely a matter of choice? A wealth of scientific evidence provides an answer. It turns out that sexual orientation is virtually never a black-and-white matter. Rather it exists on a continuum, with both genes and environment determining where people end up.

Biblical Proportions

It is difficult for most people to think objectively about homosexuality, in large part because biases against it are literally of biblical proportions. According to the book of Leviticus, homosexuality—at least when practiced by males—is prohibited, punishable by death. Thousands of American pulpits to this day repeat the old biblical injunctions, which fuel discomfort with homosexuality at every layer of our society.

Until recent decades, prejudice against homosexuality has persisted even in the mental health professions. In the 1970s most therapists still held that homosexuality was a psychological disorder, akin to a disease. In the 1968 edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM)*—the indispensable diagnostic tool used by therapists—homosexuality appeared in the section on sexual deviations as an instance of an aberration in which sexual interests are “directed primarily toward objects other than people of the opposite sex.”

It was largely gays themselves—understandably tired of being viewed as freaks of nature—who began to assert that their orientation was not pathological. A defining moment came on June 27, 1969, after a police raid on a gay bar in Greenwich Village in New York City provoked a riot. Crowds continued to gather at the site for another five days, protesting discrimination and preaching gay rights. Now called the Stonewall Riots (named after the Stonewall Inn, which was at the center of the melee), they galvanized the modern gay-rights movement in America and initiated a shift toward greater cultural acceptance of homosexuality.

A mere four years later, in 1973, the nomenclature committee of the American Psychiatric Association (APA) set about reassessing the

profession's dark characterization of homosexuality. Leading the charge was psychiatrist Robert L. Spitzer of Columbia University. As a result of his committee's recommendation, the term "homosexuality" disappeared from the next edition of the *DSM*. That hardly settled the matter, however. In a poll of psychiatrists conducted soon after the APA's leadership voted to make the change, 37 percent said they opposed the change, and some accused the APA of "sacrificing scientific principles" in the service of "civil rights"—in other words, of giving in to pressure.

Switching Sides?

Robert L. Spitzer was an ardent Trotskyite in his youth, and his father was a Maoist. At one point, he was even the vice president of the NAACP chapter at Cornell University. Maybe his background explains why, in 1972, when the psychiatrist first witnessed a gay protest at a psychology convention, it was he who approached the protesters, not the other way around. He saw social injustice, and he wanted to help.

He told the protesters he was a member of the nomenclature committee revising the *Diagnostic and Statistical Manual of Mental Disorders (DSM)* for the American Psychiatric Association and that he would ask its members to allow gay activists to present their views. Ultimately, the committee recommended that the term "homosexuality" be eliminated from the *DSM*. The governing board of the APA then voted 13 to 0 (with two abstentions) to accept the recommendation—an extraordinary leap for gay rights in America.

Today Spitzer, now at Columbia University, explains that neither he nor his committee ever meant to suggest that homosexuality was normal or healthy; such a conclusion would be "very wrong." "Just because something is not a mental disorder doesn't mean it's normal," Spitzer explains.

What is more, Spitzer says, the committee was careful to preserve a category of dysfunction—still in the *DSM* today—that allowed unhappy gays to seek change. "Distress" over one's sexual orientation is still listed as a disorder. As a practical matter, he says, this category applies only to gays, not to heterosexuals. "I don't think there are heterosexuals," he says, "who wish they only were attracted to the same sex."

There was "tremendous opposition" to removing "homosexuality" from the *DSM*. How, then, does he account for that unanimous vote? "I think the leadership at that time decided, 'We gotta do this whether we like it or not. We gotta stop the gays from breaking up our meetings. We gotta help them out, and this makes sense.'" He adds: "It helped gays feel better and get treated better. Scientifically it may not have been correct, but socially it sure was."

In 1999 Spitzer entered the sexuality fray again—this time approaching a group of self-proclaimed ex-gays who were protesting at a convention. That event led to his controversial recent study, which suggests that some homosexuals can turn straight.

Formerly a hero to gays, Spitzer is now the reluctant darling of the Christian right, and his new research has been labeled "despicable" by a colleague at Columbia. Spitzer sees no contradictions in his actions: "I think of myself as a guy who loves controversy, loves to be where the action is—and I did some courageous things."

Credit: Robert Epstein

Changing “Truths”

Matt Avery had no doubt about his orientation when he first became sexually active in his teens. During college in the early 1980s, he worked at a gay bar and had hundreds of sexual partners. He also had a four-year relationship with a man. Matt considered himself “feminine.” “I was 140 pounds, had long fingernails, a blond ponytail and wore an earring,” he reminisces. “I was a sight to be seen.”

But when he was 24 his partner returned from a weekend retreat with some incredible news. Being gay, his partner said, “wasn’t a truth” for him. Matt was distraught. “My whole life,” he says, “was defined by whomever I was with—whomever I could use to make up for my own faults.” After their sexual relationship ended, they stayed roommates and friends. But then, Matt says, “he started dating this woman.” This change was another blow, especially because Matt was still seeing multiple men at the time. He was shaken but also curious. “One day,” he recalls, “I decided homosexuality might not be a truth for me either, and I went on a date with a woman. It was pretty good.”

Within two or three years he found himself involved exclusively with women. He made the shift without therapy and without the influence of religious groups. He was supported, he says, by friends who helped him deal with “issues involving his father.” They helped him learn to be comfortable with his masculinity. Matt got to the point where even his sexual fantasies about men disappeared. In that respect, he probably became straighter than many heterosexuals. Although Matt made the switch without professional assistance, others—sometimes under tremendous social pressure from family members or religious groups—seek out “reparative” therapists to help them become straight.

Floyd Godfrey—himself formerly gay—has been a reparative therapist in Arizona for six years. His office has five clinicians, and they see 30 to 40 clients a week, many of whom are men struggling to overcome homosexual tendencies. Godfrey says they come because they are depressed, anxious and unhappy. “They feel out of place,” he says. “They don’t feel like one of the guys. When people feel like they don’t fit in, that can produce depression.”

Some, he says, are young men whose fathers were abusive or neglectful. “Their dad was never available for them to bond with. Or sometimes mom was controlling or overprotective. The bottom line,” Godfrey says, “is that there was a disruption during childhood of the bond that normally develops between father and son.” Deficient upbringing, Godfrey claims, can sometimes lead to same-sex attractions.

Let us set aside the obvious question for the moment—whether the therapy works—and consider a more basic issue. Why is it called “reparative”? Doesn’t this term presume that homosexuality is somehow invalid—that gays are like broken washing machines that need to be repaired? In other words, isn’t this therapy a retrenchment to the old disease model of homosexuality that Spitzer and his colleagues dispatched more than 30 years ago?

It seems so. Those deeply entrenched notions affect even the way we talk about homosexuality. Even the common term “sexual preference” reflects bias, suggesting that orientation is entirely a matter of choice. As for the claim made by Godfrey and others that homosexuality is the result of poor parenting, there is simply no legitimate scientific evidence to support it. Whereas it is true that some homosexuals had poor relationships with their fathers when they were growing up, it is impossible to say whether those fathers produced homosexual tendencies in their sons by rejecting them or, instead, whether some fathers simply tend to shun boys who are effeminate at the outset.

As for the effectiveness of reparative therapy—referred to by some as reorientation therapy—initial studies such as a small one published in 2002 by New York psychologists Ariel Shidlo and Michael Schroeder suggested that such therapy worked poorly or only occasionally.

In a landmark study published in the *Archives of Sexual Behavior* in October 2003, however, Spitzer interviewed 200 men and women who once considered themselves homosexuals but who had lived their lives as heterosexuals for at least five years. Most of the participants had undergone some form of reorientation therapy. In addition to determining whether such therapy actually worked, Spitzer wanted to know just how dramatically people could alter their orientation. To his surprise, most of his subjects not only reported living long-term (more than 10 years) as

heterosexuals, they also declared they had experienced “changes in sexual attraction, fantasy and desire” consistent with heterosexuality. The changes were clear for both sexes.

Not everyone who sets out to change his or her sexual orientation is successful in doing so, however. How can we understand these dynamics—why many people want to change, why some can, and why some appear unable to do so?

Continuity Rules

At the heart of the controversy about homosexuality are some microscopically small objects: the strands of proteins that make up our genes. Two genetic issues are relevant to our understanding of homosexuality. First, do genes play any role in sexual orientation? And second, if genes do help determine orientation, do they actually create two distinct types of orientation—gay and straight, as most people believe—or do they create a continuum of orientation?

A variety of studies suggest that genes play at least some role in homosexuality. Although no one study is entirely conclusive, studies of twins raised together, twins raised apart and family trees suggest—at least for males—that the more genes one shares with a homosexual relative, the more likely it is that one will be homosexual—the hallmark of a genetic characteristic. But more interesting for our purposes is the question of a continuum. Sometimes, as with eye color, genes create discrete characteristics. But with many attributes, such as height and head width, genes create continuities. Whereas most people believe that “straight” and “gay” are discrete categories, there is strong evidence that they are not—and this fact has important implications for the way we understand the various controversies surrounding homosexuality.

Ever since the late 1940s, when biologist Alfred Kinsey published his extensive reports on sexual practices in the U.S., it has been clear, as Kinsey put it, that people “do not represent two discrete populations, heterosexual and homosexual....The living world is a continuum in each and every one of its aspects.” A recent position statement by the APA, the American Academy of Pediatrics and eight other national organizations agrees that “sexual orientation falls along a continuum.” In other words,

sexual attraction is simply not a black-and-white matter, and the labels “straight” and “gay” do not capture the complexities.

For obvious evolutionary reasons, most people are strongly inclined to prefer opposite-sex partners, because such relationships produce children who continue the human race. But a few—probably between 3 and 7 percent of the population—are exclusively attracted to members of the same sex, and many are in the middle. If a person’s genes place him or her toward one end of what I call the Sexual Orientation Continuum, he or she almost certainly can never become homosexual. If the genes place the person at the other end of the curve, he or she almost certainly cannot become straight—or at least not a happy straight. But if an individual is somewhere in between, environment can be a major influence, especially when the person is young. Because society strongly favors the straight life, in the vast majority of cases the shift will be toward heterosexuality.

The way sexuality plays out is eerily similar to the process by which people become left- or right-handed. It may sound contrary to common sense, but scientific studies suggest that genes play a relatively small role in handedness; its heritability—an estimate of what proportion of a trait’s variability can be accounted for by genes—is only about 0.32, compared with, say, 0.84 for height and 0.95 for head width. Then why is more than 90 percent of the population right-handed? It is because of that cultural “push” working again. Subtle and not so subtle influences make children favor their right hand, and the flexibility they probably had when they were young is simply lost as they grow up. Although they can still *use* the left hand, their handedness becomes so well established that they would find it difficult, if not impossible, to become left-handed.

Preliminary studies by psychologist J. Michael Bailey of Northwestern University, Michael King of University College London and others suggest that the heritability of homosexuality is not much higher than that of handedness—perhaps in the range 0.25 to 0.50 or so for males and somewhat lower for females. This finding raises an intriguing question: If people were raised in a truly orientation-neutral culture, what sexual orientation would they express? Although it is unlikely that half of us would end up gay, without societal pressure it is clear that a much larger

proportion of the population would express homosexuality than we see now.

Matt's Choice

As for Matt, it is likely that he, like most or all people who change sexual orientation, was not near an extreme end of the continuum to begin with. It is unreasonable to say that he has been returned to a “natural” state, however; with strong social support, he has simply chosen a new path for himself—one that his genes made possible but that is almost certainly not possible for every gay person. Someday I suspect that psychobiological research will allow us to find precise physical correlates of sexual orientation: genes, neural structures or perhaps more subtle physical characteristics. But no advances in science will ever completely resolve the moral and philosophical issues that Matt’s conversion raises.

Do gays have a choice? Because of the enormous pressures pushing all of us toward the straight end of the Sexual Orientation Continuum from the time we are very young, it is reasonable to assume that most of the people who currently live as homosexuals were probably close to the gay end of the continuum to begin with; in other words, they probably have strong genetic tendencies toward homosexuality. Even though the evidence is clear that some gays can switch their sexual orientation, the vast majority probably cannot—or at least not comfortably. If you doubt that—and assuming that you are right-handed—try eating with your left hand for a day or two, and good luck with your soup.

How Gay Are You?

To see where you fall on the Sexual Orientation Continuum, take this simple quiz. It is designed to produce a statistically correct distribution along the lines of the continuum shown in the illustration on the opposite page.

How strongly are you attracted to members of the opposite sex?

- 0 = VERY STRONGLY
- 1 = MODERATELY
- 2 = NOT AT ALL

Have you ever felt sexually attracted to a member of the same sex?

- 0 = NO
- 1 = YES

Have you ever had a dream about a sexual encounter with a member of the same sex?

- 0 = NO
- 1 = YES

Have you ever had a waking fantasy about a sexual encounter with a member of the same sex?

- 0 = NO
- 1 = YES

Have you ever voluntarily had sexual contact (such as kissing or petting) with a member of the same sex?

- 0 = NO
- 1 = YES

How frequent are your same-sex fantasies or dreams?

- 0 = NEVER HAD THEM
- 1 = RARE OR OCCASIONAL
- 2 = FREQUENT

Have you ever felt sexually aroused when you've had any exposure to two people of your same sex having a sexual encounter (through gossip, a video or some other means)?

- 0 = NO
- 1 = YES

Would you be willing to have sexual relations with someone of the same sex?

- 0 = NO
- 1 = MAYBE
- 2 = YES

How frequent are your same-sex encounters?

- 0 = NEVER HAD THEM
- 1 = RARE OR OCCASIONAL
- 2 = FREQUENT

Now add up the numbers and see where you stand:

- 0–1: Exclusively heterosexual
- 2–3: Predominantly heterosexual
- 4–5: Predominantly heterosexual, with homosexual tendencies
- 6–7: Equally heterosexual and homosexual
- 8–9: Predominantly homosexual, with heterosexual tendencies
- 10–11: Predominantly homosexual
- 12–13: Exclusively homosexual

Credit: David Johnson

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(February/March 2006)

Follow Up: Sexuality and Choice

by the Editors

Can we choose our sexual orientation? Given the polarized nature of the discussion among national leaders, it would be logical to think that the public's opinions must be equally divided. On the one hand, religious conservatives argue that being homosexual is a choice. On the other, the National Gay and Lesbian Task Force and at least a few experts counter that sexual orientation is immutable, something that we are born with. After running an article by psychologist Robert Epstein—"Do Gays Have a Choice?"—that explored the related research, the editors at *Scientific American Mind* wanted to know how the public felt about these issues. We recently commissioned a nationwide poll to find out—and received some surprising results.

Although the editors worried that people might not be comfortable answering questions about sexuality, the online poll conducted by Zogby International drew more than 4,200 responses. Half the respondents believed that sexual orientation is not a choice but rather is "innate, genetic or predetermined by other factors such as environment." Another 34 percent believed that "sexual orientation is determined by both choice and other factors." In contrast, only 11 percent agreed that "sexual orientation is a conscious choice." Six percent were not sure. The margin of error for the sample was plus or minus 1.5 percentage points.

"I think the results are surprising and spectacular," says Epstein. "There is clearly a myth about what people generally believe about sexuality."

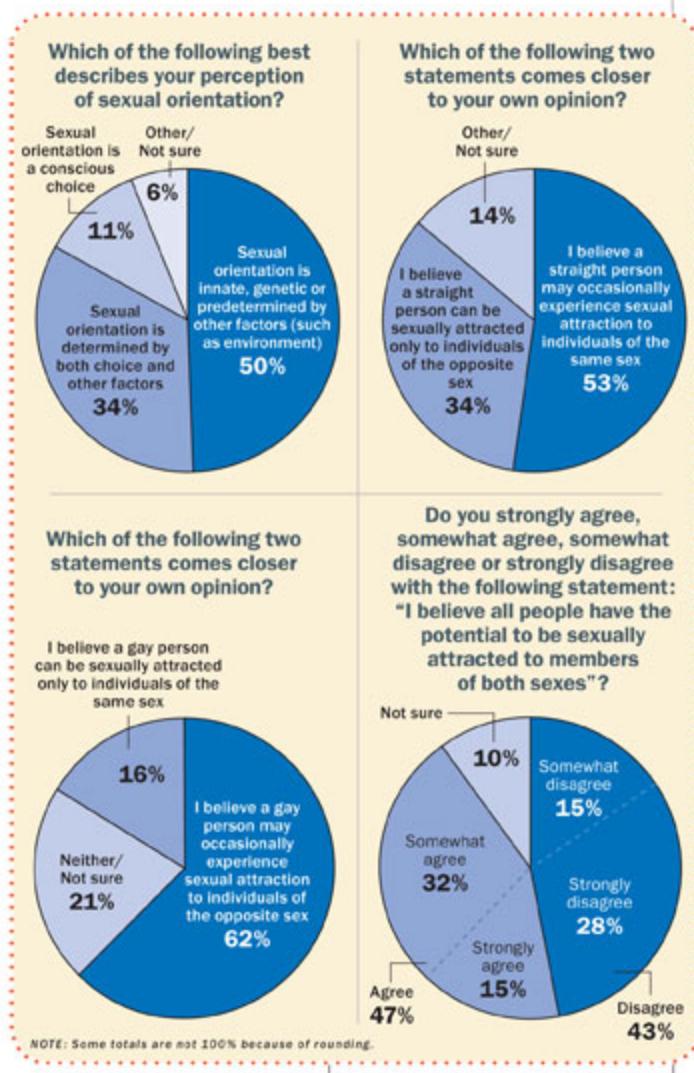
Epstein's article made the point that sexuality exists on a continuum, with both genetics and environment playing a role in determining where people end up. The majority occupy the heterosexual end of the continuum, as a result of both genetics and a "push" provided by social

pressures. For people who fall near one extreme or the other (exclusive attraction to either same-sex or opposite-sex partners), choice about sexual orientation is very limited, if it exists at all. As a result, “reparative” therapies and other techniques that seek to switch homosexuals to heterosexuality work only if an individual’s makeup permits.

Likewise, responses to the poll indicated that people believe that sexual orientation occurs along something of a spectrum, with both straight and gay people having the potential to be attracted to individuals of either sex.

Some 47 percent of the poll respondents, a slight plurality, agreed with the following statement: “I believe that all people have the potential to be sexually attracted to members of both sexes.” But a distinct majority (53 percent) said they believed that “a straight person may occasionally experience sexual attraction to individuals of the same sex.” An even higher number (62 percent) believed that “a gay person may occasionally experience sexual attraction to individuals of the opposite sex.”

Sexuality Poll Results



Credit: Scientific American Mind

Group Variations

Although the belief that sexuality is not a choice is generally widely held, a closer look at some groups reveals differences of opinion as well. For instance, the idea that sexuality is innate was particularly prevalent among Americans aged 50 to 64 (53 percent) and aged 18 to 29 (51 percent), single people (58.5 percent), Hispanics (57 percent) and Democrats (72 percent).

People who identified themselves as conservatives were more likely to think that sexual orientation was either fully or partly a choice. This opinion was especially common among those who said they were “very

conservative”; nearly 80 percent held that sexuality is a choice, with only 15 percent believing that it is determined by genetics or other factors.

Men and women were deeply divided in their perceptions of sexual orientation: 60 percent of females believed it is “innate, genetic or predetermined by other factors such as environment.” Only 39 percent of men agreed.

The belief that “all people have the potential to be sexually attracted to members of both sexes” was especially prevalent among adults younger than 30 (66 percent). Groups that expressed high levels of disagreement included people aged 65 and older (53 percent), those who identified themselves as frequent Wal-Mart shoppers (58 percent), NASCAR fans (56 percent), and those who called themselves born-agains (59 percent).

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(April/May 2006)

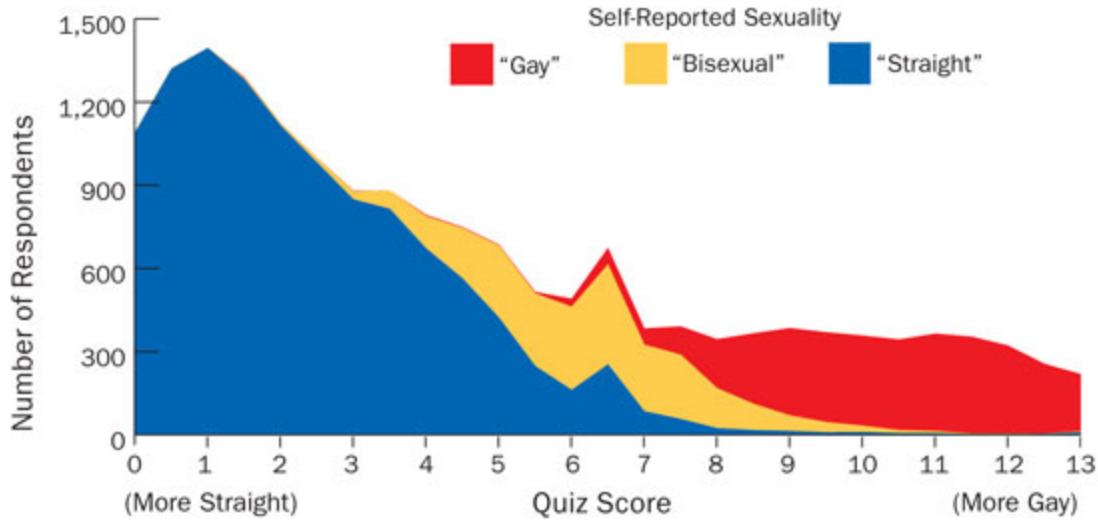
Smooth Thinking about Sexuality

by Robert Epstein

Is sexual orientation similar to eye color, consisting of fairly discrete categories? Or is it more like height—that is, falling along a continuum? Although common thinking holds that everyone is either “gay” or “straight,” my new survey of nearly 18,000 people who voluntarily answered an online quiz shows that these terms are highly misleading. Sexual orientation actually lies on a smooth continuum, and the way people state their orientation is often a poor predictor of their true sexual behaviors and fantasies. Someone can call himself “gay” but behave “straight,” and vice versa.

At the Society for the Scientific Study of Sexuality meeting in November 2007, I reported that the same continuum of scores exists in the U.S. and in the average of scores from a dozen countries outside the U.S. I also found that fewer than 10 percent of subjects score as “pure” heterosexual or homosexual and that females place, on average, farther toward the gay end of the continuum than males do. My study suggests that characterizing sexual orientation properly requires two numbers: mean sexual orientation (where a given person lies on the continuum) and sexual orientation range (how much flexibility or “choice” the person has in expressing that orientation, which also forms a continuum).

An online survey of nearly 18,000 people shows that sexual orientation falls on a continuum and that the labels “straight,” “gay” and “bisexual” are often misleading.



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(October/November 2007)

The Third Gender

by Jesse Bering

The reigning queen of Belfast, Northern Ireland, is the “Baroness” Titti Von Tramp, a deeply bronzed, thoroughly waxed and statuesque figure approaching seven feet tall in stiletto heels, wearing tinted couture glasses and crowned with a perfect platinum mane. On any given night, you can find the bosomy Von Tramp at one of the local nightclubs, pursing her strawberry-colored lips in a photo-op for one of her many fans or perhaps making an Ulster businessman turn bright red by deviously running one long, manly finger down the man’s cheek and judging, “That’s a good year.”

For many people, the term “transvestite” is synonymous with such larger-than-life characters, an entertaining coterie of mostly gay men and their oversexed female alter egos. But as with any human demographic, transvestites are a very diverse bunch, and it is only a select few who can turn their minority status into such a lucrative career in drag theatrics. For more modest individuals, the limelight is hardly a desirable place to be. Furthermore, the psychological motivation to dress or act as the opposite sex varies widely—transvestism is but one of the many manifestations of transgender behavior in the human species.

As researchers probe the biological, psychological and cultural underpinnings of transsexuality in its myriad forms, they continue to be astounded by the individual variation they find. And many scientists believe that this incredible diversity offers an important opportunity to unravel the subtle threads tying together biological sex, gender and sexual orientation. In fact, it is only because these traits occasionally fail to match up along predictable lines in a single individual that scientists fully realize how very distinct these variables are from one another.

Gender vs. Sex

Biological sex is perhaps the most straightforward of the three variables at the heart of the science of transsexuality. We all have a set of sex chromosomes that identifies each of us either as a genetic male (XY) or as a genetic female (XX). Of course, as we learned from the recent case of Olympic runner Caster Semenya, a woman rumored to have a genetic abnormality that gave her body malelike strength, chromosomal sex is not always so obvious. There are many genetic disorders in which sex chromosomes are either missing or redundant (for example, XYY), and birth defects can occur in which infants are born with ambiguous genitalia. But in general, researchers who study gender identity disorder—the clinical term for what we colloquially know as transsexuality—exclude individuals with underlying chromosomal or somatic abnormalities such as the one rumored to affect Semenya. Transsexuals are people with normal chromosomes—biological males or females—who feel, psychologically, like the opposite sex.

This brings us to the concept of gender, which is meaningfully different from biological sex. Gender identity is a subjective feeling of “maleness” and “femaleness.” In most cases, biological (genetic) males have a male gender identity, and biological females have a female gender identity. When a disconnection occurs between a person’s biological sex and his or her gender identity, however, an uncomfortable gender dysphoria can arise. This persistent negative emotional state is often a factor in the decision to undergo sex reassignment surgery, which many transsexuals choose to do.

The third variable related to sex and gender is sexual orientation. Most biological males are attracted to biological females, and vice versa. Yet the very fact that homosexuals (and bisexuals) exist—and, more important, are represented by such a wide, stereotype-shattering spectrum of individuals that includes both “lipstick lesbians” and very masculine gay men—shows clearly that sexual orientation, too, is separable from both biological sex and gender identity. It is worth pointing out that homosexuality itself is not a transsexual behavior—gay men, in general, do not want to become women—but transsexual people can be either straight or gay.

In teasing apart these three related but distinct constructs of biology, gender and sexual orientation, scientists are starting to better understand the phenomenon of transsexuality, a term defined by the American Psychological Association as “a strong and persistent cross-gender identification and a persistent discomfort with [one’s] biological sex.” Their findings are revealing that even within the transsexual community there is much diversity. For example, a biological male who experiences gender dysphoria, and thus “feels” like a female, can be either gay or straight when it comes to his sexual orientation. And beyond the mixing and matching that occurs between sex, gender and sexual orientation, a huge array of psychological and cultural factors seems to underlie or affect transsexuality. Scientists are only starting to unravel these seemingly innumerate influences.

Mind over Gender

Although mental states can differ widely among transsexuals, most report experiencing gender dysphoria—the unhappy mismatch between biological sex and gender identity. A good example of gender dysphoria is the case of Chaz, formerly Chastity, Bono, daughter-cum-son of entertainers Sonny and Cher. After living most of her adult life as a lesbian, Bono announced in mid-2008 that he was in fact a transsexual and had begun to transition from the lesbian “Chastity” to the straight male identity of “Chaz.” (Chaz is just as attracted to his girlfriend as Chastity was before the transition, only given Bono’s physical metamorphosis, theirs is arguably no longer a same-sex relationship.) As a female-to-male (FtM) transsexual, Chaz has already had his breasts removed and has embarked on a regimen of testosterone treatment, which has caused his voice to drop by a full octave as well as stimulated a noticeable five o’clock shadow.

“Gender is between your ears and not between your legs,” Bono said during a 2009 interview with ABC’s *Good Morning America*. “As a child, it was really clear. I felt like a boy....As you get older, it gets more confusing, because suddenly there’s more pressure to fit into your assigned gender identity. [And so] a lot of FtMs end up doing a stint in the lesbian community because it just kind of makes sense.”

Nearly all FtM transsexuals have a similar story—they are overwhelmingly homosexual (attracted to women). Male-to-female (MtF) transsexuals, on the other hand, are a much more diverse group, in terms of both their sexual orientation and the psychological underpinnings of their transsexuality.

In the late 1980s University of Toronto psychiatrist Ray Blanchard introduced the theory of “autogynephilia,” in which he argued that heterosexual MtF transsexuals (that is, biological males who are attracted to women but who wish to transition to a female identity) are in fact sexually aroused by the thought of themselves as females. As an example of autogynephilia, consider the following account by male-to-female transsexual Nancy Hunt in her memoir *Mirror Image* (Holt, Rinehart and Winston, 1978). “I was feverishly interested in [girls],” Hunt writes. “I studied their hair, their clothes, their figures. And I brooded about the increasing differences between us. I seethed with envy while at the same time becoming sexually aroused—I wanted to possess them even as I wanted to become them. In my night-time fantasies, as I masturbated or floated towards sleep, I combined the two compulsions, dreaming of sex but with myself as the girl.”

Love Thy Self

According to Blanchard, such cases exemplify “erotic target location errors,” in which individuals seek to change their appearance so that they more resemble the persons or things they desire. Whereas most people search for their erotic targets elsewhere, autogynophiles are prone to a search strategy error whereby they identify the object of their desires under their very own skin.

Unsurprisingly, Blanchard’s theory of autogynephilia rubs many transsexuals the wrong way. Sex may be a part of it, they say, but their identities have less to do with deviant desires than with feeling simply that they are women trapped in the bodies of men. But recently a prominent psychologist named Anne Lawrence—a male-to-female transsexual herself—has advocated a more nuanced version of Blanchard’s theory. Just as relationships evolve from primarily lusty and erotic attractions to more romantic, less overtly sexual forms of love, she says, so, too, might

autogynephiles slowly develop a nonsexual, romantic attachment to themselves as women.

Lawrence bases her theory on the similarities she has noticed among the heterosexual MtF transsexuals in her Seattle clinic. Most are quite masculine in appearance and have led successful lives as men, usually in male-dominated professions such as engineering, business or computer science; often they are married and have several children. Curiously, many have autisticlike traits: they seem more interested in “things” than in other people and have a background of poor social relationships. And almost invariably, Lawrence points out, they have a history of sexual arousal by cross-dressing.

In a 2007 article in *Perspectives in Biology and Medicine*, Lawrence writes that the heterosexual MtF transsexuals she has seen “typically want to undergo sex reassignment surgery as quickly as possible and want their new genitals to resemble as closely as possible the female genitals they love and idealize. After surgery, these transsexuals are not only relieved to be rid of their male genitals but are delighted with their female-appearing genitals and are often eager to display them to other people (e.g., at transgender support group meetings).”

In contrast, homosexual MtF transsexuals—those attracted to men—do not idealize female genitalia and “often seem indifferent or ambivalent about undergoing sex reassignment surgery,” Lawrence writes. Indeed, most researchers agree that there are meaningful differences between gay and straight MtF transsexuals—including, intriguingly, the cultures in which they exist.

Emerging Cultures

Cultural influences are perhaps the least understood aspect of transsexuality—in large part because the effects of culture are so hard to define and study. Still, the evidence suggests that these factors strongly influence whether MtF transsexuals tend to be gay or straight. In Far Eastern countries such as Korea, Malaysia, Singapore and Thailand, fewer than 5 percent of MtF transsexuals may be heterosexual. The rest are homosexual biological males, usually extremely feminine in their behavior and appearance and exclusively attracted to men. (These are the

so-called kathoeys or ladyboys of Southeast Asia.) In striking contrast, this ratio of gay to straight is almost perfectly flipped in the West, where 75 percent or more of American and British MtF transsexuals are heterosexual—attracted to women—or bisexual.

Lawrence published a study online in December 2008 in the *Archives of Sexual Behavior* that may help explain this trend. She reports that the more a society is collectivist—that is, the more it values social norms over individual expression—the greater the percentage of homosexual MtF transsexuals. This correlation, she says, could result from the fact that in collectivist countries, such as those in Southeast Asia, effeminate, homosexual men are not well tolerated—they may fare better as women in accepted transgender roles such as ladyboys. Men who are too masculine to pass as women, on the other hand, would be shunned if they tried to do so. Countries such as the U.S. and the U.K., on the other hand, place more value on individual expression and personal choice and are therefore more tolerant of both effeminate men and masculine MtF transsexuals.

Clearly, there are radical differences underlying the expression of transsexuality—differences involving the elusive causal algorithms of individual experience, personality, biology and culture. Scientists working in this area have made considerable progress, but much remains a mystery. Fortunately, the past decade or so has seen transsexuals increasingly “coming out of the closet” as a sexual minority. There was an especially sharp increase in clinic-referred adolescents with gender identity disorder starting in 2004, which is still rising. This dramatic spike may be the result of the de stigmatizing influence of media exposure. Movies such as *Boys Don’t Cry* (1999) and *Transamerica* (2005) offer sympathetic portrayals of transsexuals, and the subject of childhood gender identity disorder has been featured in the *New York Times*, on ABC’s *20/20* and on the *Oprah Winfrey Show*.

As transsexuals continue to become more open about their experiences, scientists are realizing that cross-gender behavior is not only a fascinating expression of human variation but also a richly informative area for studying the subtlest vagaries of sexuality. Like no other aspect of our nature, transsexuality is where biology, gender and sexual orientation meet—and, as we have seen, often part ways.

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(May/June 2010)

SECTION 6

The Darker Side

Why Do Men Buy Sex?

by Nikolas Westerhoff

Arthur is an alleged john, a man who patronizes prostitutes. After his arrest on September 5, 2008, his photograph appeared on the Web site of the Chicago Police Department. Arthur (not his real name) was far from the only person so branded on this Internet portal. Samuel, 59, and José, 34, (whose names were also changed to protect their privacy) were on this online pillory for a month after their September 5 arrests.

The apprehensions of Arthur, Samuel, José and many others represent the huge demand among males for prostitutes. In the U.S., police officers detained about 78,000 people in 2007 for prostitution-related crimes, according to the Federal Bureau of Investigation. Experts believe that about 10 percent of these arrests are of the sex patrons, almost all of whom are men.

Overall, an estimated 16 percent of men pay for sex in the U.S., according to a 2005 report by social work professor Sven-Axel Måansson of Malmö University in Sweden. And a study published in 2000 of 998 street prostitutes and 83 call girls in Los Angeles led by sociologist Janet Lever of California State University, Los Angeles, suggests that 28 percent of men who patronize prostitutes and nearly half of those who employ call girls buy sex regularly, with the rest being occasional customers.

The proportion of patrons seems to vary considerably by country and by study. Måansson reported that 14 percent of Dutch men have bought sex as compared with nearly 40 percent of men in Spain. (Prostitution is legal in both countries.)

And according to HYDRA, a Berlin-based organization that provides legal advice and other aid to prostitutes, up to three quarters of men in

Germany, which also has legalized prostitution, have paid for sexual services. Meanwhile other estimates for Germany put the proportion far lower, at about one fifth. In Thailand, where prostitution is illegal but socially accepted, one study suggested that a whopping 95 percent of men have slept with a prostitute.

Whatever the numbers, the behavior is prevalent enough that psychologists cannot easily write it off as pathological. Rather men's motives for buying sex are hotly contested among researchers. Some believe the practice serves as a salve for common psychological afflictions, such as an unfulfilled appetite for sex, love or romance. Others paint a dimmer portrait of johns, believing they are typically driven by chauvinistic motives, such as a desire to dominate and control women. A similar debate rages among experts about the morality of prostitution itself.

An Oppressive Act or a Harmless Game?

Although prostitution, as a business or behavior, is generally frowned on in the U.S. as immoral in principle, philosophers may assign deeper meaning to the practice of buying and selling sex. These theorists, however, disagree dramatically about what that meaning is. Whereas some believe prostitution is a manifestation of the tendency of men to exploit women, others contend that the behavior more likely reflects the repression of sexual impulses by monogamous societies. Here are arguments from both sides of the street:

Critics of prostitution see it as a patriarchal act in which the goal of the john is to subjugate and exploit women. They view the contractual regulation of sexual acts between men and women as fundamentally illegitimate—and not only in the context of prostitution. When men enter into marriage contracts, they are often using their financial power to gain unlimited access to female bodies. Even if forcing a partner to engage in sex is legally considered rape, as long as women are in an economically inferior position many experts, such as philosopher Christine Overall of Queen's University in Ontario, see an element of force in sex between married partners as well as between a john and a prostitute.

Supporters of prostitution see it as a type of harmless sexual play that enables experimentation by both parties: one person may like oral sex, whereas another prefers bondage or cross-dressing. Prostitution is simply role-playing for a fee. For instance, philosopher Andrea Güter, who wrote a chapter in a 1994 book about prostitution, believes our sexual desires have to be suppressed to meet the requirements of a monogamous society. Human beings buy sex, she says, because of the difficulty of engaging in sexual intercourse outside established couples relationships. Sexual services are aimed primarily at men not because men want to dominate women but because of the oppressive cultural myth of the chaste woman. Some advocates for this view, such as sociologist Sabine Kleinhammes, who authored a 1988 volume on the

subject, believe that a utopian society would seek not to eliminate prostitution but rather to offer a comparable service for women.

Credit: Nikolas Westerhoff

Basic Instinct

Of course, the simplest explanation for men buying sex is that they like it. After all, people are generally willing to pay for activities they enjoy as much as they do sex. On the other hand, a man can usually get sex for free in the context of an ordinary intimate relationship. So why pay good money for it, especially given the social and health risks of having sex with a prostitute? Are all johns so unappealing that they cannot get sex any other way?

Most researchers do not think so. Johns come from all socioeconomic classes, according to culture researcher Sabine Grenz of Humboldt University of Berlin. They may be stockbrokers, truck drivers, teachers, priests or law-enforcement officials. Many are married with children. “There are no social characteristics that basically distinguish johns from other men,” says Grenz, who published her interviews with a large number of johns in a 2005 book.

Nor are these men defined by obvious personality problems. In a survey published in 1994 psychologist Dieter Kleiber of the Free University of Berlin had some 600 johns fill out the Freiburg Personality Inventory and found no particular abnormalities. The only correlations he found applied to risk taking and unprotected sex. For example, the men who demanded sex without condoms tended to score higher on aggression, and married and well-to-do customers practiced unprotected sex more frequently than others did. “The more secure and orderly a man’s life is, the more he believes in his own invulnerability,” Kleiber concludes.

The research underscores the diversity of the men who pay for sex. Accordingly, these individuals seek prostitutes for varied reasons. Some of them may indeed be driven purely by sexual impulse. In a study of johns sponsored by the Rosa Luxemburg Foundation, sociologist Udo Gerheim of Bremen, Germany, found that many of these men are either sexually frustrated (because they are not getting satisfying sex elsewhere) or hedonists who want to live out their erotic fantasies in a red-light setting.

Representatives of HYDRA similarly say that men go to prostitutes to appease a sexual appetite. Many men feel freer to experiment within the context of commercial sex than with their wives or girlfriends, enabling them to expand their sexual range and to experience greater sexual fulfillment.

Fee for Romance?

Yet some researchers have identified emotional and psychological motivations among the men who purchase sex. Gerheim spotted a type of romantic john who imagines that he is having a genuine relationship with a prostitute based on mutual trust. Kleiber also saw a romantic streak in many of his interviewees. These men, Kleiber explains, seem to be pursuing the ideal of love in a fee-for-service setting.

When Kleiber and his colleagues asked johns to characterize their prostitutes, most rated them as “charming” and “open.” Some also said these women were “intelligent” and “witty.” Many of the men painted a picture of a perfect woman whom they would like to get to know better. A few even penned statements such as “I can easily imagine the prostitute to whom I go as my wife.” “These men have emotionally charged relationships with prostitutes,” Kleiber says. They portray these relationships as intimate despite their commercial nature and limited scope, he adds.

The behavior of male customers during their encounters with prostitutes also may suggest that they seek a social connection outside of coitus. From her interviews with Los Angeles prostitutes, Lever learned that purchasers of sex often ask indiscreet questions such as “Where do you come from?” or “Is Lara your real name?” before and after the act.

As if to continue their “relationship,” many if not most johns prefer to go back to the same prostitute over and over again. According to Kleiber’s study, more than two thirds of devotees used the services of a particular prostitute more than 50 times. One in four had sex with the same prostitute more than 100 times.

But why would a man turn to a prostitute—as opposed to a girlfriend, wife or other consensual female lover—to satisfy his need for a social bond? One reason may be that real relationships with women are risky and

complicated, features that men do not always want and cannot always handle. Prostitutes are far less exacting than girlfriends and wives and may even be soothing to the psyche.

That is, an ordinary female date might reject a man or happen to be tired, distant or not in the mood. In contrast, sex workers generally accept their customers unconditionally and offer intimacy on demand, whatever their true feelings, says gender researcher Gunda Schumann, who co-authored a 1980 book on the psychology of prostitution. “They offer the men emotional involvement, psychic stability and empathy,” she observes. In this view, ordinary men buy sex to deal with their psychological insecurities as well as their sexual needs.

The idea that sex with a prostitute can be therapeutic dates back thousands of years. In the *Epic of Gilgamesh*, a poem from ancient Mesopotamia, Enkidu—a friend of the king who is half wild—is civilized by having sex with a whore. The tale portrays the prostitute as sacred because she sacrifices herself to the man to cleanse him of destructive inner forces.

“Material” Girls

Other researchers disagree that prostitutes serve as a balm for the woes of essentially normal men. Sociologist Julia O’Connell Davidson of the University of Nottingham in England characterizes johns as necrophiliacs who commit their acts on socially “dead” women. These are men, she says, whose sexual desire is switched on by *not* having to care about the prostitute as a human being—the opposite of the intimacy hypothesis.

“What turns the john on is the woman’s powerlessness,” O’Connell Davidson concludes. Sex with a prostitute, she says, is more about seeking revenge on women or exerting control over them than about a quest for intimacy and romance.

In a speech he gave to the European Parliament in 2006, Måansson pointed out that johns frequently speak about sex “as a consumer product rather than an expression of intimate relations.” One man, he reported, compared sex with a prostitute to “going to McDonald’s.” Indeed, on the Internet, where a person can remain relatively anonymous, many johns

refer to women as “material,” Gerheim notes, and may also describe misogynistic submission fantasies.

Some sex purchasers may even have a social agenda to go along with their personal predilections. For many of them, Måansson opines, a prostitute’s bed represents the last bastion of antifeminism. Only there can men reestablish the traditional male dominance over women.

Catering to such men, brothels in countries where these institutions are legal hawk women like merchandise on their Web sites. Meanwhile nudist clubs in nations such as Germany attract customers with “all-inclusive” deals: for a fixed price (often less than \$100), men can have sex with any of the women present. Some clubs even offer happy-hour specials.

Måansson believes that johns are usually psychologically disturbed and in need of counseling and treatment. Many Swedish johns similarly view their sexual behavior as “out of control” or “psychologically toxic,” a self-characterization certain scientists reject. In the opinion of these dissenters, johns in the U.S. and other countries that ban prostitution are unjustly criminalized and labeled mentally unstable.

However toxic the activity might be to the men, the women often end up more seriously wounded by it. At the very least, prostitutes suffer psychologically from trying to wall off their own emotions so that they can sell intimacy as a commodity. In addition, they often suffer from physical abuse at the hands of johns. The 2006 annual report of KARO, an organization trying to thwart prostitution in the region dividing Germany and the Czech Republic, noted many incidents of brutality related to the selling of sex. Prostitutes in the U.S. are also subject to high levels of violence.

Prostitution is not a profession women pursue because they like the work. As stated on the KARO Web site: “Very few women have ever said that they voluntarily became prostitutes.” Poverty, drug addiction or fear of violence from pimps often pushes women into the sex trade.

Thus, many experts argue that the female sex workers are not the real drivers of prostitution. Instead the business survives because of demand from the legions of males who have problems in their relationships with women. This rationale lies behind the law in Sweden that came into force

in 1999 under which selling sex is legal but buying sex is not. The same notion also propels a growing crop of workshops and classes in the U.S. aimed at discouraging offending males from repeating an act that many consider a crime against women.

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Psychology Uncovers Sex Appeal of Dark Personalities

by Daisy Grewal

Although most people probably don't consider narcissism or psychopathy desirable qualities in either their friends or romantic partners, many of us are mysteriously drawn toward people with these personality traits. Mean girls are often the most popular ones at school and vampires are sex symbols. Recent research has found that people with so-called "dark" personality traits are more physically attractive than others. What is it about dark personalities that make them so appealing? The answer may help us understand what makes people with these personality traits so successful at exploiting others.

Nicholas Holtzman and Michael Strube of Washington University in St. Louis were interested in looking at the relationship between physical attractiveness and people's tendencies towards narcissism, psychopathy, and Machiavellianism. They wanted to find out whether these three traits, referred to as the "dark triad," are associated with a greater ability to successfully enhance one's physical appearance.

To test this idea, they invited 111 college students (64 percent women) into their laboratory. Each student was photographed soon after they arrived. Then, after taking this initial photograph, each student asked to change out of their own clothes and put on a pair of gray sweatpants and a t-shirt. Women were instructed to remove any makeup, and anyone with long hair was asked to pull it back into a ponytail. The students were then photographed in this more natural state. Holtzman and Strube showed both sets of photographs to a group of strangers who rated them in terms of physical attractiveness. By comparing the attractiveness ratings of the dressed-down and dressed-up students, the researchers were able to

determine how much each student was able to make themselves more appealing through flashy clothes, makeup, accessories, etc.

Next Holtzman and Strube assessed the students' personalities and their tendencies towards narcissism, psychopathy, and Machiavellianism. They asked the students to rate themselves and to provide email addresses for a few of their friends so that the researchers could ask them to provide ratings as well. This combination of self and peer ratings was used to calculate a final set personality scores for each student. Furthermore, the students' ratings on narcissism, psychopathy, and Machiavellianism were combined into create a composite "dark triad" score.

The dark triad score was positively correlated with their "dressed-up" attractiveness—a finding that mirrors previous findings. However, the dark triad score was not related to ratings of physical attractiveness in the dressed-down photos. In other words, people with dark personality traits are not seen as more physically attractive than others when you take away their freedom to wear their own clothes and makeup. People with dark personalities seem to be better at making themselves physically appealing.

The findings reinforce previous research showing that narcissists are more popular than others, literally at first sight. Mitja Back and Boris Egloff of Johannes Gutenberg-University of Mainz along with Stefan Schmukle at Westfälische Wilhelms-University of Muenster conducted a study in 2010 where they collected information on students' personalities and then had them briefly introduce themselves to one another. After these brief introductions, the students filled out surveys asking about the first impressions made by each other. Students scoring higher on narcissism were seen as more likeable. People perceived the narcissists as more likeable and found that they had flashier appearances, more confident body language, and more attractive facial expressions. Together with Holtzman and Strube's findings, this suggests that narcissists are more skilled at carrying and presenting themselves in a way that immediately impresses others.

This is yet another reason why it may be important to take your time in forming judgments when you get to know someone. The initial appeal of the narcissist or psychopath may be hard to resist. Physical attractiveness is often automatically associated with a host of other positive traits—a

phenomenon known as “the halo effect.” When we perceive someone as physically attractive, we automatically assume they are also kinder, smarter, and more confident. Therefore, creating a physically attractive veneer is a highly effective way of creating an advantageous first impression. Combining physical attractiveness with confidence and humor is even more effective, and it appears that people with exploitative personalities are more successful at this as well.

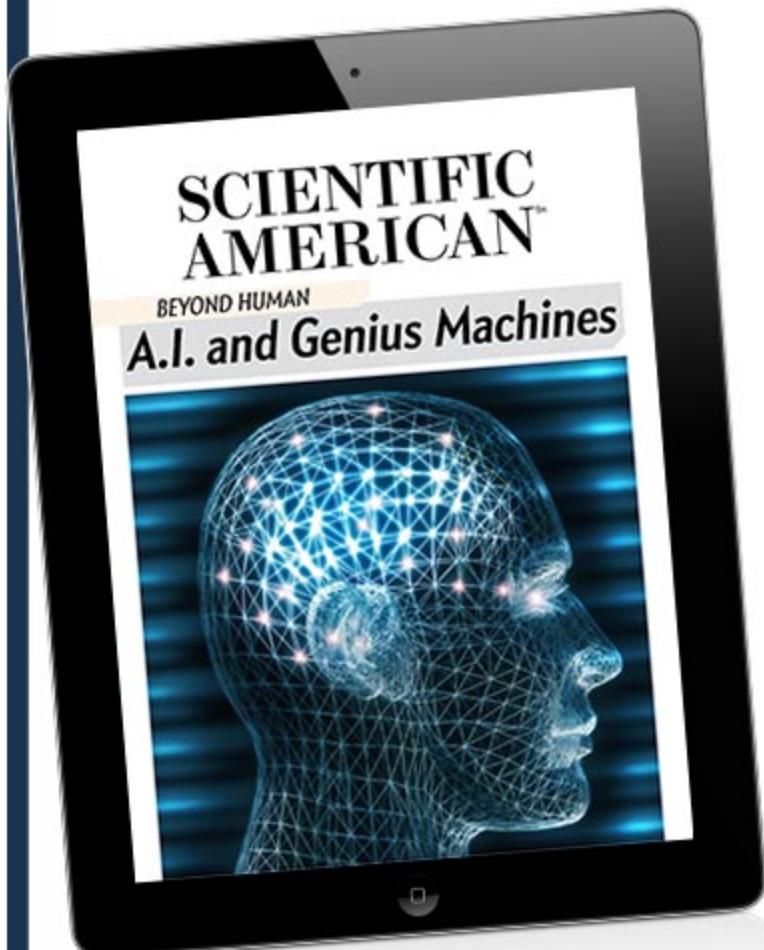
The more humble among us can take heart in knowing that despite these initial advantages, narcissists’ popularity tends to decline over time. The process may take several weeks, perhaps because people with dark personality traits are skilled at keeping their unsavory side hidden. However, since the hallmark of these personality traits is interpersonal exploitation, it is only a matter of time before those closest to them get wise to their ways and start to avoid them. When it comes to long-term relationships, either in fiction or reality, most people shy away from those with dark personality traits. Maybe that’s why in order to sustain our interest over multiple books or movies, that alluring vampire or villain needs to have a heart of gold.

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